**Design and Development of Online Survey System**

By

**TAN FANG YEN (WEK020251)**

Under supervision of

**Mrs. Sri Devi A/P Ravana**

Moderator

**Assoc Prof Salimah Mokhtar**

**ABSTRACT**

Doing survey is one of the unavoidable events. But the key point is how far a survey can be conducted in a moderately effective and efficient way? Doing survey online is advisable and since an idea of Online Survey System (OSS) is being advocated.

OSS, or in other saying, a web based survey system, is being introduced in order to reduce or mitigate, even to complement the drawbacks of manual/ traditional methods. OSS is implementing able as long as the Internet access is available within the user's mean. Besides, the user is required to have at least one email account.

With the event of OSS, the users can create and design their own interactive online survey. OSS provides a fast and wide distribution of survey form to a large geographical area through email. The related respondents just need to click on the attached URL in the invitation email. Then they will be directed to the survey area. Afterward the OSS will generate analysis report based on the responses collected. Users will be able to get the results in tabular and pictorial forms.

**ABSTRAK**

Kajian tinjauan merupakan salah satu perkara yang tidak dapat dielakkan. Namun bagaimana untuk menjalankan kajian tinjauan tersebut secara berkesan merupakan sebuah kunci utama yang patut dititikberatkan. Menjalankan kajian tinjauan secara *online* adalah dianggap wajar dan berikutan idea *Online Survey System (OSS)* diperkenalkan.

*OSS,* atau dengan kata lain, sebuah sistem kajian tinjauan yang berdasarkan konsep web, diperkenalkan demi mengurangkan atau meminimakan, lebih-lebihan sebagai pelengkap bagi cara-cara kajian tinjauan yang sebelum diamalkan secara *manual* atau tradisional. *OSS* dapat diimplementasikan selagi perkhidmatan *Internet* adalah didapati. Selain itu, pengguna adalah diwajidkan mempunyai sekurang-kurangnya satu akaun email.

Dengan perkenalan *OSS,* pengguna-pengguna dapat mencipta dan mereka soal selidik secara interaktif. *OOS* memungkinkan kajian soal selidik yang dihasilkan diagihkan dalam kadar yang cepat dan berlanjutkan ke sebuah kawasan lingkungan geografi yang agak luas dengan melalui email. Pihak berkaitan hanya perlu clik pada *URL* yang diiringi bersama *invitation* email. Selepasnya mereka akan ditujukan ke tempat dimana soal selidik telah disediakan. *OSS* akan menghasilkan laporan analisis berdasarkan hasil kajian yang dikumpulkan. Pengguna-pengguna selanjutkan akan memperolehi keputusan yang berkenaan dalam format berbentuk *tabular* dan graf.

**ACKNOWLEDGEMENT**

First of all, I would like to express my appreciation to my supervisor, Mrs. Sri Devi A/P Ravana for her encouragement, support, patience, advice, and guidance throughout the course of this study.

Besides, I would like to thank my moderator, Prof Madya Salimah Mokhtar for her idea contributions, advice, and comments.

Lastly, I would like to express my deepest gratitude to my buddies who consist of partner, graduates, course mates, and others. You all had made a substantial contribution to my efforts in producing this project.

Thank you.

# TABLE OF CONTENT

## LIST OF FIGURE

## LIST OF TABLE

# CHAPTER 1 INTRODUCTION

## 1.1 Project Overview

Nowadays, the deployment and the advancement of technology in various fields, such as business management, education, administration, and so on, have already been entered an incredible and astonishing stage. To remain even to enhance their worldwide competitiveness advantages in the unforeseen global trends, many enterprises (either governmental or private), organizations, or higher educational institutions are urged to apply the latest or durable technologies in advocating and enhancing their transactions. Conducting survey is undoubtedly one of the common and inevitable transactions not matter how their differences are.

In accordance with that, it is advisable to have a system which can ease the survey conducting procedures by computerizing that can hit their specified or customized objectives or targets in meaningful and effective ways.

Thus, a project which is so called Online Survey System (OSS) or in other words, web based system, is being introduced. It functions through the internet with its own database server. This system owns the characteristic to automate the entire creation processes of interactive online survey. Meanwhile, the completed survey will be distributed through several online mail services providers such as Hotmail as long as the internet connection is available anywhere. Furthermore the system is able to analysis and displays automatically the collected data (results) in pictorial forms, such as graphs, tables, and charts on the web browser. The users also can send their feedbacks through the emails for further improvement in the future time.

## 1.2 Problem Definitions

The manual / traditional practices of surveying methods consist of many drawbacks. In this section the highlight will be located on some of these identifiable drawbacks:

i) Time

i. Lots of paper work

Paper-based surveys consume a great deal of time which started from the initial steps, such as planning, testing, printing, distributing and collecting until the final analysis and any prerequisite documentation. All these steps consume a lot of papers as well. Such circumstance is even worsening if the surveys are being conducted in a large scale.

ii. Manual data analysis

A great deal of manual workloads involved in this phase before the reasonable conclusion and assumptions can be drawn from that particular survey's outcomes. Such circumstance is particularly critical as the analysis result have to be produced out in a certain period of time.

ii) Restrict to certain geographical areas

Traditional surveys hardly can be conducted in considerable areas (abroad or worldwide) due to the constraint of time; cost, transportation, knowledge about those areas, related policies and manpower spend.

iii) Cost

In the traditional survey, we need to consider the cost of paper used, printing and photocopying. Additional costs such as manpower participation in distribution and answering (commercial aspects) should also be taken into account.

iv) Result

Human errors and peccadilloes do exist in the traditional survey methods such as mismatch the survey objective that lead to unqualified even erroneous questionnaires, self limitations (individual or team's experience) and so on. This can contributed to the inaccurate result outcomes.

## 1.3 Project Objectives

The main objective of design and development of Online Survey System is to solve the existing traditional survey methods problems as being mentioned above. The core objectives are:

i) Allow user to plan, customize, construct, modify, or reproduce the surveys in a quick, automated, dynamic and easy way. Provide instant survey analysis processes in the pictorial forms, such as graphs, charts and table views of data as well as the savable and printable facilities. Indirectly will save lots of time.

ii) Allow fast distribution of the survey form to a large geographical area through emails.

iii) Enable the interactive online survey processes which involve give (distribute) and gain (feedback). This will directly minimize or mitigate the cost of conducting a survey.

iv) Provide attractive user-friendly graphic interface of survey. Indirectly will help to increase the response rate and the accuracy of the result.

### 1.4 Project Scopes

The Online Survey System is specially designed to ease the survey conducting procedures as well as to complement the traditional survey methods' drawbacks. The scopes are:

i) The survey information is available in English version only.

ii) OSS is web application where users should have internet access together with personal or specific purpose email accounts.

iii) The system should allow users to conduct the survey according to their requirements.

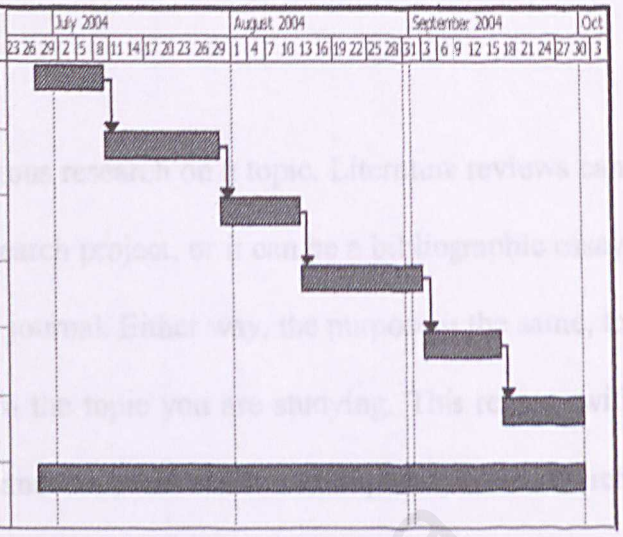
iv) The system should be able to perform simple analysis processes.

v) The system should have its own database system to keep track of the records.

vi) The targeted audiences should take into account all users in different domains who are interested in online survey project title.

## 1.5 Project Schedule

| Task Name | Duration | Start | Finish |
|---|---|---|---|
| Project Introduction | 10 days | Mon 6/28/04 | Fri 7/9/04 |
| Literature Review | 15 days | Sat 7/10/04 | Thu 7/29/04 |
| Methodology | 10 days | Fri 7/30/04 | Thu 8/12/04 |
| System Analysis | 15 days | Fri 8/13/04 | Thu 9/2/04 |
| System Design | 10 days | Fri 9/3/04 | Thu 9/16/04 |
| Viva Preparation & Presentatic | 10 days | Fri 9/17/04 | Thu 9/30/04 |
| Documentation | 70 days | Mon 6/28/04 | Thu 9/30/04 |




Duration

Figure 1.1: Project Progress

# CHAPTER 2 LITERATURE REVIEW

## 2.1 Definition

A literature review is a summary of previous research on a topic. Literature reviews can be either a part of a larger report of a research project, or it can be a bibliographic essay that is published separately in a scholarly journal. Either way, the purpose is the same, to review the scholarly literature relevant to the topic you are studying. This review will help you design your methodology and help others to interpret your research (*http://info.wlu.edu/literature_review/literature_review.html*, 25/9/2004).

There are three sections will be discussed in this chapter, namely (1) Questionnaire; (2) Existing system reviews; (3) Supportive findings (summary).

### 2.1.1 Questionnaire

Survey questionnaire owns the characteristics: (1) The people need to be questioned are widely dispersed; (2) A quick way to gather massive amount of data; (3) An exploratory study and overall opinion to be gauged before the project can be design properly.

#### 2.1.1.1 Design and Development of Questionnaire

The questionnaire was designed with the aim to survey the usage of computer, internet and online survey. It consisted of two main parts. Namely section A and section B. Section A mainly depicted the demographic details of the respondent whereas section B emphasized on the survey related issues. The respondent was ensured of the confidentiality of the information given. The questionnaire had been tested in order to

ensure the readability before the survey being conducted. Several amendments also been done along with the testing process.

#### 2.1.1.2 Conducting Survey

Completed and tested questionnaire was then been printed out and photocopied into an amount of 150 copies. Afterward they were distributed among undergraduates, staffs, and lecturers from different faculties of UM as well as the people outside. In order to ensure the balance between the distribution and the feedback, the questionnaire were collected on the spot during the proceeding.

#### 2.1.1.3 Analysis

The questionnaires had been processed and analyzed by using the SPSS version 12.0 software. The result outcomes then being quantified and tabulated. The pictorial forms were utilized as well in order to promote understanding and readability among the readers.

##### 2.1.1.3.1 Demographic Details

Table 2.1: Gender Proportion

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 73 | 48.7 | 48.7 | 48.7 |
| | Female | 77 | 51.3 | 51.3 | 100.0 |
| | Total | 150 | 100.0 | 100.0 | |

Table 2.1 had shown a rather balanced proportion between males and females who had participated in the survey questionnaires.

Table 2.2: Age Group

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Below 25 | 134 | 89.3 | 89.3 | 89.3 |
| | 26-30 years | 9 | 6.0 | 6.0 | 95.3 |
| | 31-40 years | 7 | 4.7 | 4.7 | 100.0 |
| | Total | 150 | 100.0 | 100.0 | |

Table 2.2 had shown that the respondents were mostly comprised of those with the age below 25. The wide range of the specified age group had contributed to the formation of such outcome.

Table 2.3: Occupation

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Academician | 142 | 94.7 | 94.7 | 94.7 |
| | Researcher | 5 | 3.3 | 3.3 | 98.0 |
| | Others | 3 | 2.0 | 2.0 | 100.0 |
| | Total | 150 | 100.0 | 100.0 | |

Table 2.3 had shown the occupation of the participants who are mostly the academicians. The formation of such outcomes was due to the survey conducting processes that were mostly conducted within University of Malaya.

**2.1.1.3.2 Survey**

Table 2.4: Importance of Survey Questionnaire Generating Processes

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Very Important | 61 | 40.7 | 40.7 | 40.7 |
| | Important | 77 | 51.3 | 51.3 | 92.0 |
| | Not very important | 10 | 6.7 | 6.7 | 98.7 |
| | Not at all | 2 | 1.3 | 1.3 | 100.0 |
| | Total | 150 | 100.0 | 100.0 | |

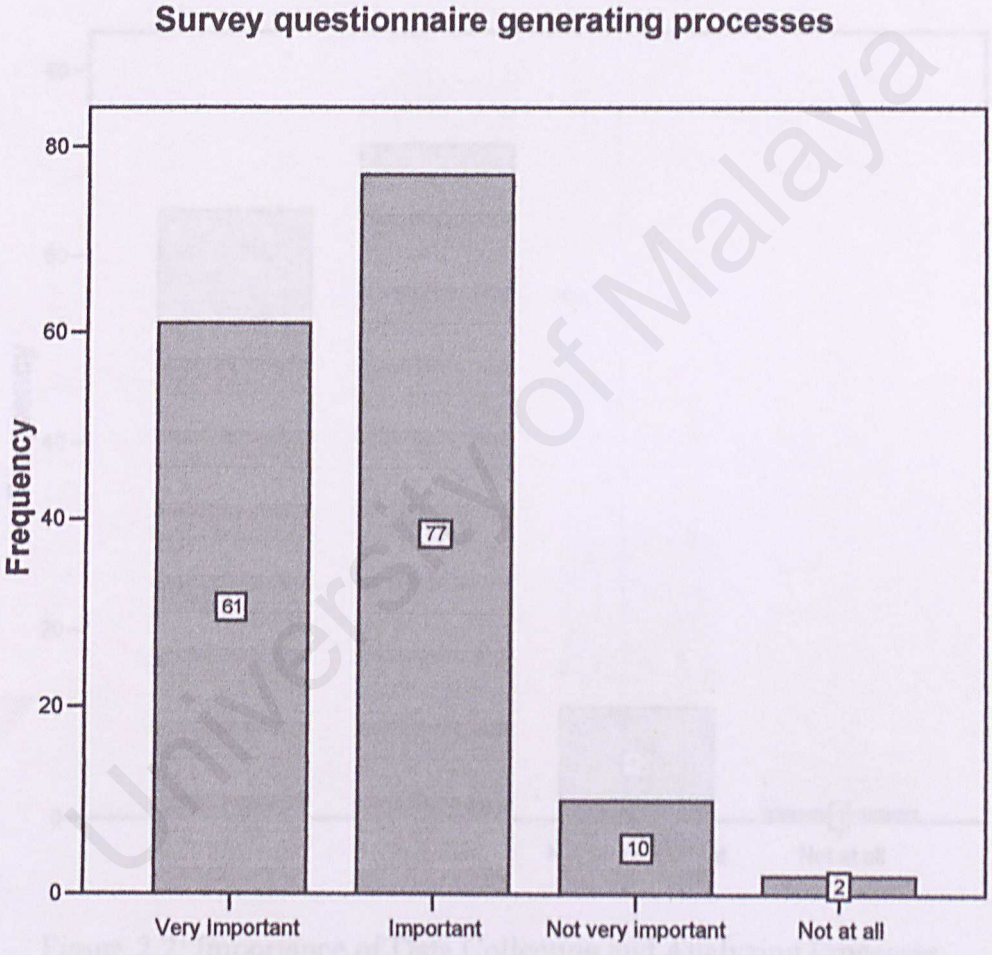



Figure 2.1: Importance of Survey Questionnaire Generating Processes

Table 2.5: Importance of Data Collecting and Analyzing Processes

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Very Important | 65 | 43.3 | 43.3 | 43.3 |
| | Important | 72 | 48.0 | 48.0 | 91.3 |
| | Not very important | 12 | 8.0 | 8.0 | 99.3 |
| | Not at all | 1 | .7 | .7 | 100.0 |
| | Total | 150 | 100.0 | 100.0 | |

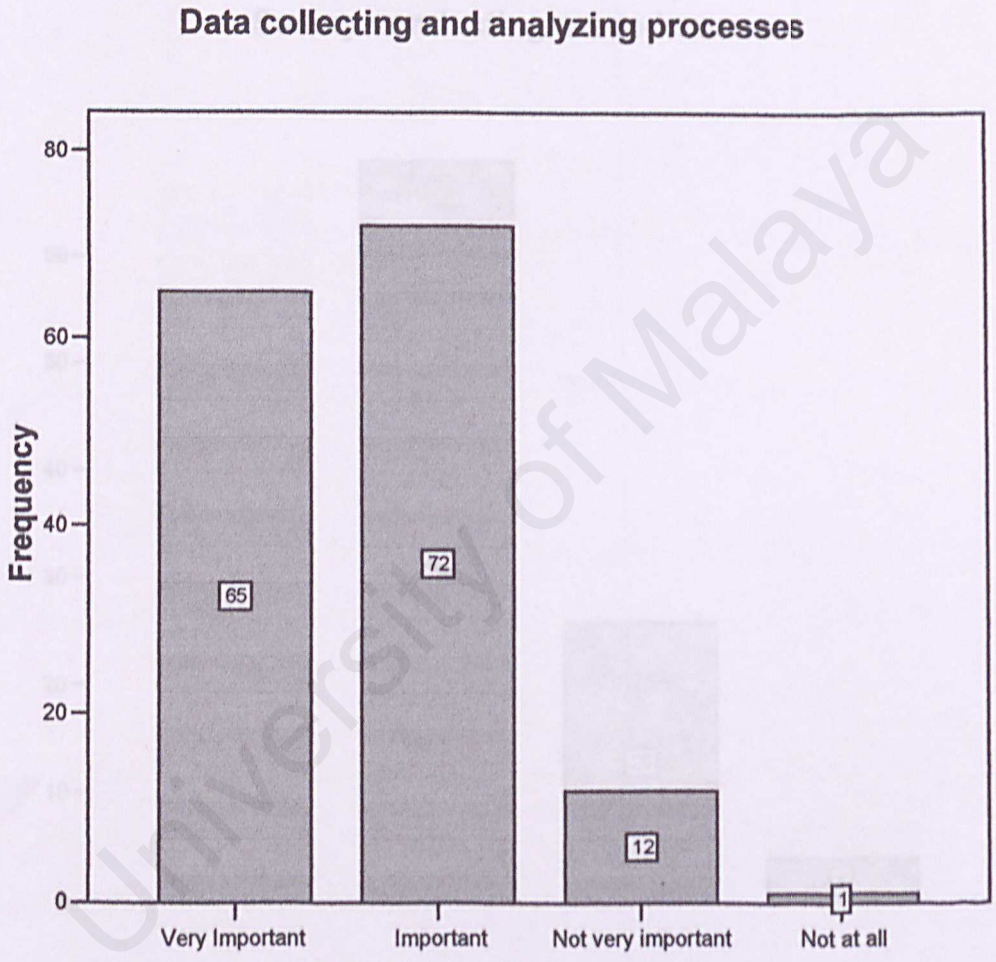



Figure 2.2: Importance of Data Collecting and Analyzing Processes

Table 2.6: Importance of Survey Conducting Procedures

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Very Important | 51 | 34.0 | 34.0 | 34.0 |
| | Important | 69 | 46.0 | 46.0 | 80.0 |
| | Not very important | 26 | 17.3 | 17.3 | 97.3 |
| | Not at all | 4 | 2.7 | 2.7 | 100.0 |
| | Total | 150 | 100.0 | 100.0 | |

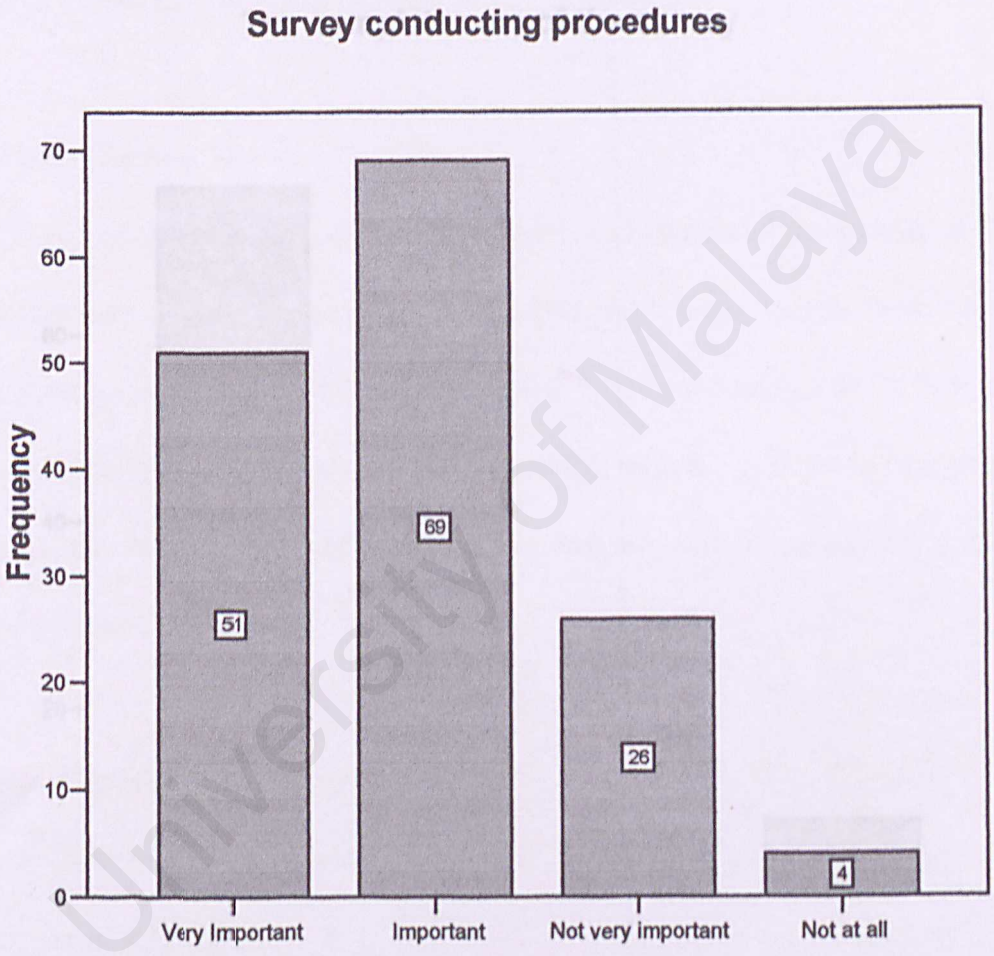



Figure 2.3: Importance of Survey Conducting Procedures

Table 2.7: Importance of the Completeness of the Survey

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Very Important | 76 | 50.7 | 50.7 | 50.7 |
| | Important | 59 | 39.3 | 39.3 | 90.0 |
| | Not very important | 7 | 4.7 | 4.7 | 94.7 |
| | Not at all | 8 | 5.3 | 5.3 | 100.0 |
| | Total | 150 | 100.0 | 100.0 | |

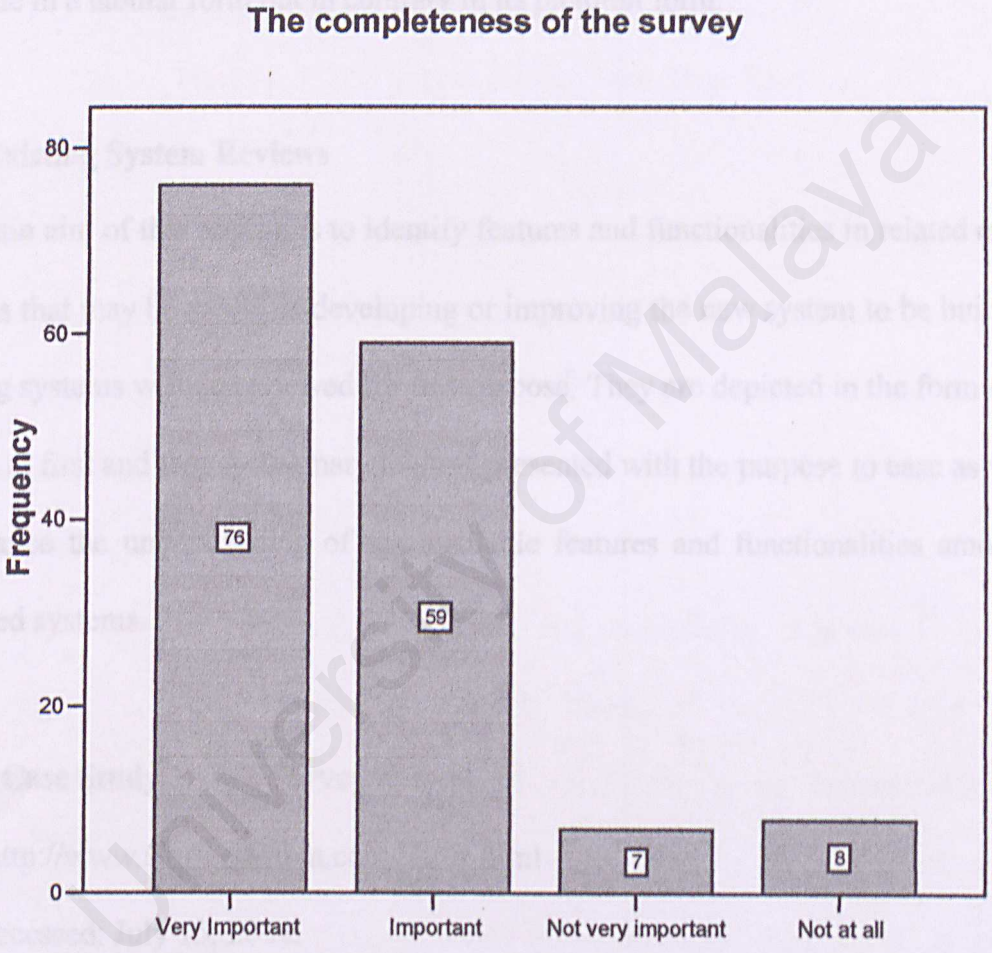



Figure 2.4: Importance of the Completeness of the Survey

From the tables and their associated graphs shown above, namely from Table 2.4 to Table 2.6 and from Figure 2.1 to Figure 2.3, most of the participants consents that

survey questionnaire generating processes, data collecting and analyzing processes and survey conducting procedures are important since these ensuring the quality, integrity and precision of the surveys conducted. Table 2.7 and its associated Figure 2.4 shown a noticeable outcome due to participants considered the difficulties might they be encountered in producing accurate and trustworthy analysis results. For instance the incompleteness of certain questions in a questionnaire might result an accurate analysis outcome in a tabular form but in contrary in its pictorial form.

### 2.1.2 Existing System Reviews

The main aim of this section is to identify features and functionalities in related existing systems that may be useful in developing or improving the new system to be built. Four existing systems will be reviewed for this purpose. They are depicted in the form of case studies at first and then a summary table is presented with the purpose to ease as well as to enhance the understanding of the available features and functionalities among the reviewed systems.

#### 2.1.2.1 Case Study 1: The Survey System

URL: http://www.surveysystem.com/index.html

Date Accessed: July 15, 2004.

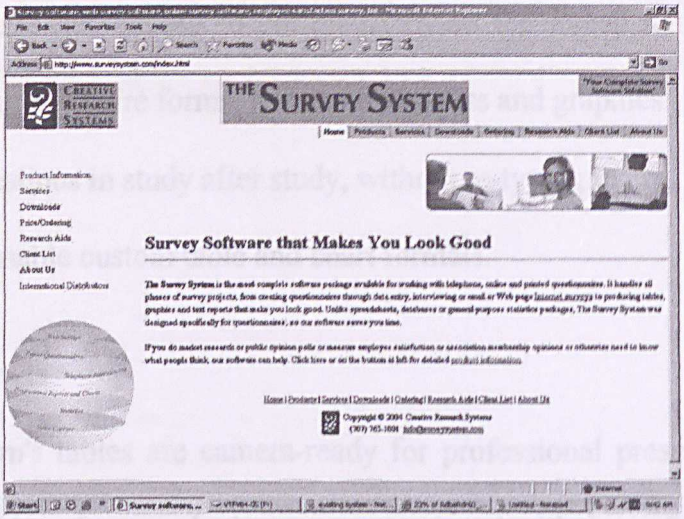



Figure 2.5: The Survey System Main Page View

The Survey System, launched by Creative Research Systems, is a comprehensive web based software packages designed particularly and specifically for the purpose of survey questionnaires, unlike spreadsheets, databases or general purpose statistics packages. The depictions about The Survey System characteristics or features are shown as below:

User Interface

The interface is rather simple, great featured, and professional. It is easy to use since there is no any command needed to memorize. Instead all the steps are done through clicks on the links, standard windows pull menus and dialog boxes. The on site Research Aids part offers useful briefings, tools, guidelines, tutorials, resources and relevant technical supports to advocate its usage by the professional and the novices. At the same time this enhances its functionality and flexibility.

**Reusability**

The Survey System's philosophy is doing the work only once, and then reuses it.

i. Enter question and answer choice labels only once.

ii. Use the same instructions to put questions on the screen for data entry and to produce questionnaire forms, tables, text reports and graphics.

iii. Re-use questions in study after study, without re-typing them.

iv. Create re-usable custom table and chart formats.

**Professional Reports**

The Survey System's tables are camera-ready for professional presentations. This site features sample tables, charts and other reports produced with this software.

You can produce many different kinds of tables. Most tables can have a "banner" format. A banner is an expansion of the cross-tabbing found in general statistics or database packages. Banners can show answers given by the entire sample and up to 60 sub-groups within the sample on the same page. You can also produce multi-page tables. The Verbatim Module produces attractive reports showing the text of responses to open-ended questions.

Many options allow you to customize your reports and enhance their visual appeal:

i. Use different fonts for different parts of reports.

ii. Frame tables with top and/or bottom lines on each page and gridlines.

iii. Incorporate a logo or graphic in your tables.

iv. Change the content and appearance of individual tables or apply changes globally.

v. Use different formats to customize the content and appearance of your tables.

vi. Produce professional quality two- and three-dimensional graphics.

vii. Show tables and charts on the same page or separately.

viii. Create basic tables showing the answers to a single question or summary tables showing a series of related questions.

ix. Rating scales or ranking questions can show Means (averages) or distributions of answers.

x. Print questionnaire forms suitable for scanning.

xi. Edit reports on-screen before printing or export them to other software via the Clipboard or various file formats.

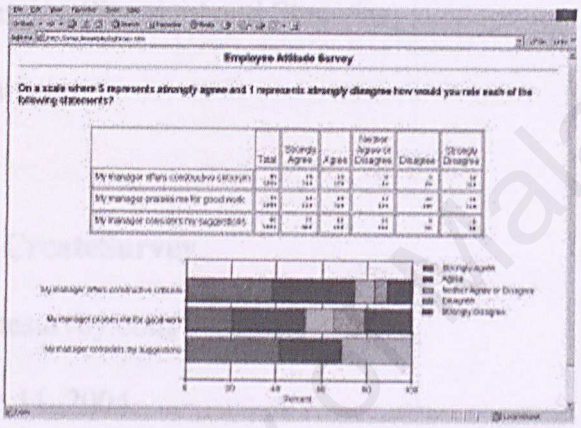



Figure 2.6: Example of Web Report Layout View

**The Voice Capture Module**

The Survey System offers the ability to capture and incorporate respondents' personalized, real with similar tape recording quality voices into a research presentation. The module offers some key strength as shown:

i. Records and plays back actual voices.

ii. Captures the feeling and intensity of responses.

iii. Creates dazzling presentations.

iv. Saves time during interviews.

v. Playback-only software is available to offer to your clients.

vi. Enables classification of interviewees, such as age, sex, geography, income and so on.

**The Statistics Module**

i. ANOVA – Analysis of Variance (One Way, Two Ways, Repeated Measures).

ii. Correlation (Person and Partial)

iii. Multiple Regression (Standard and Stepwise)

iv. Descriptive Statistics.

### 2.1.2.2 Case Study 2: CreateSurvey

URL: http://www.createsurvey.com/

Date Accessed: August 11, 2004.

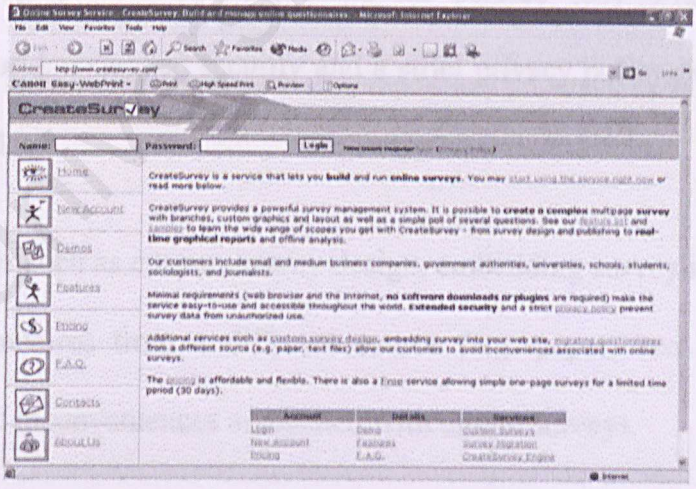



Figure 2.7: CreateSurvey Main Page View

CreateSurvey (1999) user interface is very simple, static and not so compelling or boring some (text based dominant) in general view. No command is ever needed and all the required information or services can be obtained by clicking the links or the small graphics aside. Demonstrations and Frequently Asked Question (F.A.Q) are provided to ease its usage understanding.

CreateSurvey provides a quite powerful survey management system with the possibility to create a complex multipage survey with branches, custom graphics and layout as well as a simple poll of several questions. However this service requires member login and payment at an affordable and flexible rate. Free service allowing simple one-page surveys for a limited time period (30 days) is also available.

CreateSurvey owns a very rich survey sub features as found in survey design, survey content type, survey management, survey publishing and response handling, reporting and so forth. Minimal requirements (web browser and the Internet, no software downloads or plug-ins are required) make the service easy-to-use and accessible throughout the world. Extended security and a strict privacy policy prevent survey data from unauthorized use.

Additional services such as custom survey design, embedding survey into your web site, migrating questionnaires from a different source (e.g. paper, text files) allow their customers to avoid inconveniences associated with online surveys.

### 2.1.2.3 Case Study 3: Zoomerang

URL: http://www.zoomerang.com/

Date Accessed: August 26, 2004.

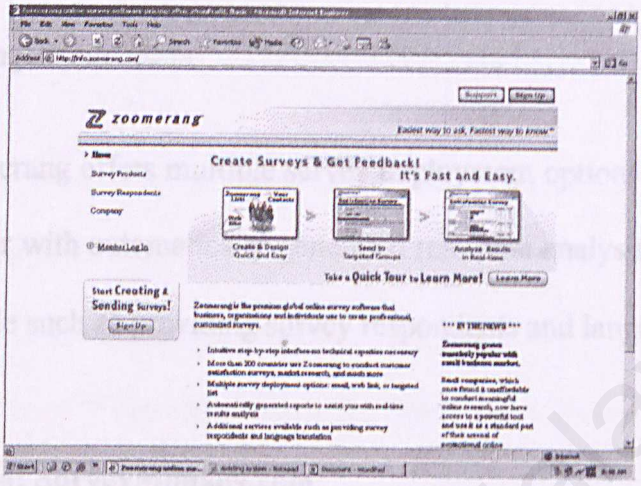



Figure 2.8: Zoomerang Main Page View

Zoomerang, the world's premier online survey software, was launched by MarketTools, Inc. in 1999 to provide a powerful, streamlined alternative for organizations needing to conduct accurate, comprehensive surveys with a minimum of cost and effort.

The Zoomerang concept - an easy to use, Internet-based survey tool allowing customers to design and send surveys and analyze the results in real time - became an almost instant hit, fueled by word of mouth from satisfied customers.

The Zoomerang user interface is quite compelling, comfortable, less complicated and vivid and balance in design architecture (graphical and textual). No command is required and the transactions are done through links and attractive buttons. Login is required in order to access the services. The quick and interesting tours lead to the ease of use of this survey software. Besides, interactive support activity or help sections are available

for further enquiry or assistance. These can be done through e-mail services or on its official web page directly.

Interactive communication is available on the main site via 'Contact Us' link. Zoomerang also provides a brief depiction on how it functions. This improves the understanding among its site users.

Furthermore, Zoomerang offers multiple survey deployment options: email, web link, or targeted list together with automatically generated real time analysis reports. Additional services are available such as providing survey respondents and language translation.

### 2.1.2.4 Case Study 4: SurveyMonkey.com

URL: http://www.surveymonkey.com/home.asp?Rnd=0.725857

Date Assessed: September 4, 2004.

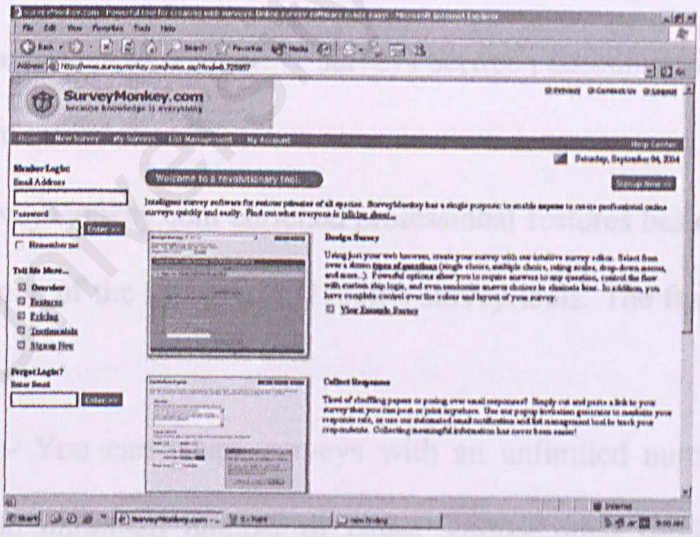



Figure 2.9: SurveyMonkey.com Main Page View

The SurveyMonkey.com (1999) interface is simple and quite information based by stating most of its three main available features that are design survey, collect responses and analyze results in a direct way together with examples or samples and download links facilities. The SurveyMonkey.com is quite unique in its login (which is a perquisite) way since email address is required instead of username together with password in order to access the services.

Most of the features can be accessible through links and standard windows pull menus and thus no command is needed. Help Center section is available for further assistance. Interactive communication is allowed through Contact Us link.

The SurveyMonkey.com offers users with the features to create new surveys (with options: 1. From Scratch; 2. From Existing) or to view (with additional functions such clear, delete) all the created surveys through lists. The e-mail list management section allows users to manage their email list (adding list) through the import, export, view messages and send message features. Users can also manage their personal and confidential accounts such as copy/move surveys between accounts, view billing history and update account information.

Moreover the SurveyMonkey.com enriched professional features besides the basic have made it becomes one of the sophisticated online survey tools. The features are listed as follows:

i. No Limits - You can create surveys with an unlimited number of questions, spanning an unlimited number of pages. Unlike other services, you are not charged extra for long surveys.

ii. Create Skip Logic (Conditional Logic) - You can customize the path a respondent takes through your survey by adding skip logic. Eliminate

unnecessary confusion by skipping non-applicable questions. A proven way to reduce "drop-outs" and overall frustration.

iii. Require Answers - Make sure that you receive a response to essential questions. You can specify on a question by question basis which questions require an answer. Helps to improve the quality of your data.

iv. Randomize Answer Choices - The ordering of choices within a question can introduce an unintended bias. Randomizing answer choices works to eliminate this "order bias".

v. Add a Logo - Branding your survey gives your survey a professional feel. You can use any logo up to 50K in size at the top of every page in your survey.

vi. Create Custom Themes - Every element of your survey can be customized: fonts, sizes, and colors. After creating your own custom theme, you can apply it to all your future surveys.

vii. Generate Popup Invitations - To increase response rates, you can create a custom popup invitation for your own website. Simply cut and paste the code into any webpage to start generating invitations. To minimize annoyance to your visitors, invitations will only popup once.

viii. Custom Redirect - Once your survey is complete, respondents will be redirected to the page of your choice. By default, completed surveys are redirected to the SurveyMonkey homepage.

ix. Filter Results - A powerful feature that helps you find patterns in your results. Ask questions such as: "Show me only those respondents who answered choice x in question y." Any question in your survey (even open-ended) can be filtered. The entire results section will reflect your filter choices.

x. Share Results - Let others view your results without giving them access to your account. You can control which results are visible, and how the results may be used.

xi. Download Results - All the data can be downloaded to your local computer for further analysis. Take your summary results into Excel to create graphs. Save the detail results to your hard drive for safekeeping. You are in complete control.

### 2.1.2.5 Summary Table for Existing System Reviews

Table 2.8: Existing Systems' Comparison

| | The Survey System | CreateSurvey | Zoomerang | SurveyMonkey.com |
|---|---|---|---|---|
| **User Interface** | • Simple, great featured, and professional.<br>• No command needed | • Very simple, static and not so compelling or boring.<br>• No command needed | • Quite compelling, comfortable, less complicated and vivid and balance in design architecture.<br>• No command is require. | • Simple and quite information based |
| **Membership** | • Free members (limited function)<br>• Paid members (full access) | • Free members (limited function)<br>• Paid members (full access) | • Free members (limited function)<br>• Paid members (full access) | • Free members (limited function)<br>• Paid members (full access) |
| **Process** | • All the steps are done through clicks on the links, standard windows pull menus and dialog boxes. | • All the required information or services can be obtained by clicking the links or the small graphics aside. | • The transactions are done through links and attractive buttons. | • Most of the features can be accessible through links and standard windows pull menus |

| | | | | |
|---|---|---|---|---|
| **Functionality** | • Reusability, Voice Capture Module, Statistics Module | • Create a complex multipage survey with branches, custom graphics and layout as well as a simple poll of several questions.<br>• Custom survey design, embedding survey into your web site, migrating questionnaires from a different source | • Offers multiple survey deployment options: email, web link, or targeted list together with automatically generated real time analysis reports.<br>• Providing survey respondents and language translation | • e-mail list management section allows users to manage their email list (adding list) through the import, export, view messages and send message features.<br>• Users can manage their personal and confidential accounts such as copy/move surveys between accounts, view billing history and update account information. |
| **Help** | • The on site Research Aids part offers useful briefings, tools, guidelines, tutorials, resources and relevant technical supports to advocate its usage by the professional and the novices. | • Demonstrations and Frequently Asked Question (F.A.Q) | • Interactive support activity or help sections are available for further enquiry or assistance. These can be done through e-mail services or on its official web page directly. | • Help Center section is available for further assistance. Interactive communication is allowed through Contact Us link. |

### 2.1.3 Relevant Findings

This section will look into some strong points of the findings that advocate and encourage the design and development of a correlated system.

#### 2.1.3.1 Summary

In considering of "should we use the Internet for quantitative survey research?" James Watt in a journal titled "Using the Internet for Quantitative Survey Research" (*http://www.swiftinteractive.com/white1.asp*, 10/7/2004) has pointed out several supportive reasons.

First, there is the speed with which a questionnaire can be created, distributed to respondents, and the data returned. Since printing, mailing, and data keying delays are eliminated, you can have data in hand within hours of writing a questionnaire. Data are obtained in electronic form, so statistical analysis programs can be programmed to process standard questionnaires and return statistical summaries and charts automatically.

A second reason to consider Internet surveys is cost. Printing, mailing, keying, and interviewer costs are eliminated, and the incremental costs of each respondent are typically low, so studies with large numbers of respondents can be done at substantial savings compared to mail or telephone surveys. Of course, there are some offsetting costs of preparing and distributing an Internet questionnaire. These costs range widely, according to the type of Internet interviewing used. Figure 2.10 shows some typical comparative costs of mail, telephone, and Internet (Web) survey research. The cost curves are based on a 5-page questionnaire, with a 35% return rate for mail and 7-minute duration for telephone interviewing. As the figure shows, the Internet survey is always

cheaper by a substantial margin than a telephone survey, is only slightly more expensive than a mail survey for surveys with fewer than about 500 respondents, and becomes increasingly less expensive than mail for more than 500 respondents.

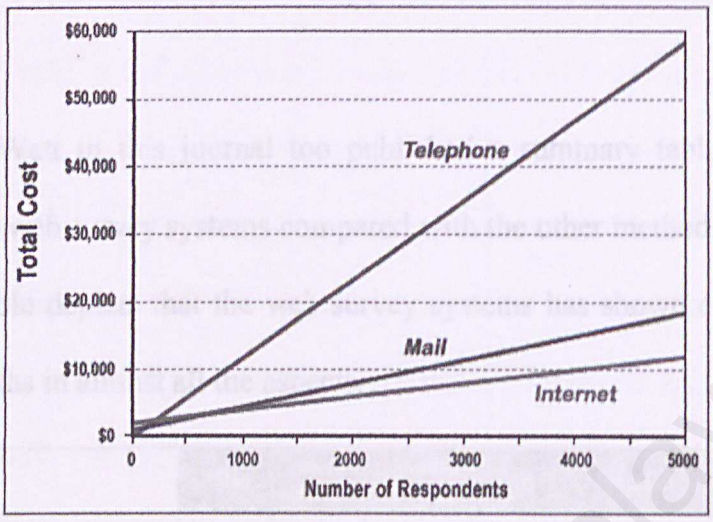



Figure 2.10: Cost Comparisons

(*http://www.swiftinteractive.com/white1.asp*, 10/7/2004).

An often overlooked benefit of Internet survey research is the ease with which an Internet survey can be quickly modified. For example, early data returns may suggest additional questions that should be asked. Changing or adding questions on-the-fly would be nearly impossible with a mail questionnaire and difficult with a telephone questionnaire, but can be achieved in a matter of minutes with some Internet survey systems.

Internet questionnaires delivered with the World Wide Web (WWW) have some unique advantages. They can be made visually pleasing with attractive fonts and graphics. The graphical and hypertext features of the WWW can be used to present products for

reaction, or to explain service offerings. For respondents with current versions of Netscape or Internet Explorer, the two most popular web browsers, audio and video can be added to the questionnaire. This multimedia ability of Web-delivered questionnaires is unique.

Besides, James Watt in this journal too published a summary table that shown the evaluation of the web survey systems compared with the other methods or technologies. The summary table depicts that the web survey systems has shown commendable and noticeable strengths in almost all the aspects.

| | E-Mail | Converted CATI | Converted Disk-By-Mail | Web CGI Programs | Web Survey Systems |
|---|---|---|---|---|---|
| Ease of creation / modification | Excellent | Fair | Good | Poor | Excellent |
| Ease of Access to Preliminary Data | Poor | Fair | Good | Excellent (w/ extra programming) | Excellent |
| Sample Quota Control | Poor | Excellent | Fair | Excellent (w/ extra programming) | Excellent |
| Data Validity Checks | Poor | Good | Good | Excellent (w/ extra programming) | Excellent |
| Demand of Respondent's Attention | Excellent | Good | Good | Good | Good |
| Personalization of Questionnaires | Fair | Fair | Poor | Excellent (w/ extra programming) | Excellent |
| Conversion of Existing Questionnaires | Fair | Excellent | Good | Good | Good |
| Expertise Required by Questionnaire Creator | Low | High | Moderate | Very High | Moderate |
| Cost per completion | Inexpensive | Expensive | Expensive | Very Expensive | Moderate to Inexpensive |

Figure 2.11: The Strengths and Weaknesses

((*http://www.swiftinteractive.com/white1.asp*, 10/7/2004)

Sharon Parker, M.A., Michael J. Schroeder and James W. Fairfield-Sonn in a journal titled "Advantages of Online Surveys" (*http://www.surveysupport.com/kcenter/planning /WhySurveyOnline.pdf*, 10/7/2004) have shown the seven advantages in using the Internet as medium for survey research. The summarized advantages include: 1) Convenience; 2) Accessibility; 3) Low cost; 4) Quicker response time; 5) Reduction of missing responses; 6) Efficient collection of comments; 7) Safe to use.

Janet Ilievam, Steve Baron and Nigel M Healey in an international journal of Market Research titled "Online surveys in marketing research: Pros and cons" (*http://www.bmra.org.uk/documents/181.doc*, 10/7/2004) have pointed out the pros of online surveys as well as the accompanied cons. The listed major advantages of online survey are: 1)very low financial resource implications; 2) short response time; 3) researcher's control of the sample (and no involvement in the survey); 4) Data are directly loaded in the data analysis software, thus saving time and resources associated with the data entry process. Whereas the identifiable limitations are:1) for large-scale cross-country surveys the multimode approach (i.e. online and postal) compensates for the misrepresentation of the general population; 2) online surveys stems from the technology required, which still suffers from being insufficiently useroriented; 3) Across all groups of users, the most commonly experienced problem with web surveys stems from the time necessary to download pages, encountered by 64.8% of respondents (Kehoe et al. 1998).

Bruzzone Research Company in a journal titled "The Top 10 Insights About The Validity Of Conducting Research. Online" (*http://www.swiftinteractive.com/white2.asp*, 10/7/2004) has listed out the top ten insights about how far the usage of online survey will prevail in the future time. They are 1) evidence is emerging on the validity of online research; 2) major new partnerships are being formed; 3) a pre-recruited online panel vs. clicking on a "want to take a survey?" button; 4) users are getting a lot more like the general population, but there are still differences; 5) balancing or weighting the samples is often critical; 6) showing ads on the web; 7) Microsoft finds online ad testing a sales

tool; 8) comparisons with phone surveys, % reached - then & now; 9) Quaker Oats finds online research useful; 10) adding up the evidence: are online surveys valid?.

# CHAPTER 3 METHODOLOGY

## 3.1 Introduction and Concept of Methodology

The system development methodology is a systematic description of the sequence of activities required to develop an information system. Each system development process (see figure 3.1) includes system requirements (user needs and resources) as input and a finished product as output.

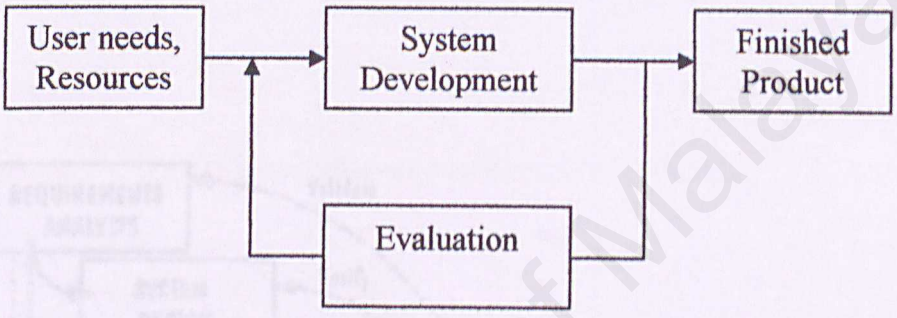



Figure 3.1: System Development Process Model

There are several process models in system development:

1. Waterfall Model
2. Prototyping Model
3. Waterfall Model with Prototyping
4. V Model
5. Spiral Model
6. Transformational Model
7. The Code And Fix Model
8. Evolutionary Prototyping Model

And so on. Three process models are being chosen for consideration before determining the most appropriate. These models are Waterfall Model with Prototyping, Evolutionary Prototyping Model, and Spiral Model.

### 3.1.1 Waterfall Model with Prototyping

Waterfall model with prototyping (see figure 3.2) consists of a waterfall model featured with prototyping activities and validation and verification processes. It is a complement to the previous Waterfall Model. The depiction of each cascading stage is shown as below.

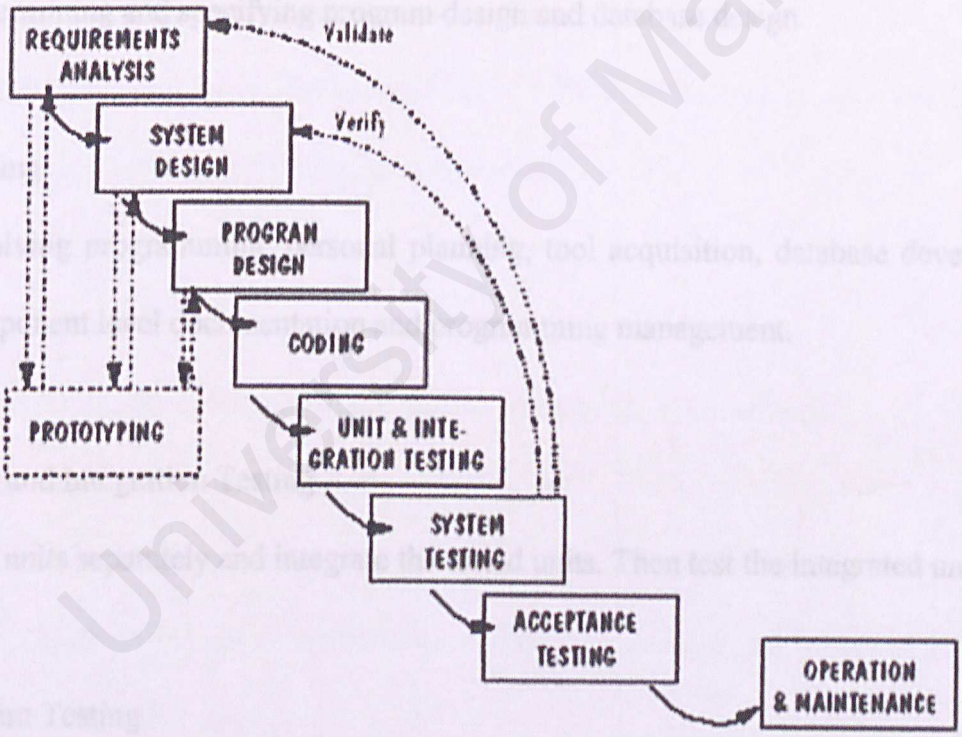



Figure 3.2: Waterfall model with prototyping

(*http://perdana.fsktm.um.edu.my/~wxes3204/SE_2_0304/sw_models_1.ppt*, 30/6/2004).

1. Requirements Analysis

   Understanding and determining users needs by having brainstorming, eliciting and analyzing user requirements by having interview, survey or questionnaire session, collecting and specifying all the user requirements and validating requirements.

2. System Design

   Outlining system functionality by having feasibility studies or case studies on current systems, determining and specifying hardware or software architectures.

3. Program Design

   Determining and specifying program design and database design.

4. Coding

   Involving programming, personal planning, tool acquisition, database development, component level documentation and programming management.

5. Unit and Integration Testing

   Test units separately and integrate the tested units. Then test the integrated units.

6. System Testing

   Combining all the integrated units into a system. Testing, specifying, reviewing and updating of the system test, validating the system requirements and verifying of system design.

7. Acceptance Testing

   Testing on system completed. The system is delivered.

8. Operation and Maintenance

   Control and maintain the system.

Prototyping is a sub process and prototype is a partially developed product or a simple simulator of the actual system to examine the proposed system and overview on the functionalities. The waterfall model with prototyping possesses two types of prototyping:

i. Requirements prototyping: to ensure that the requirements are feasible and practical, if not revisions are made at the requirements stage.
ii. Design prototyping: helps developers assess alternative design strategies and decide which is best for a particular project.

The importance of prototyping is shown as below:

i. To ensure the system meet the performance goals or constraints.
ii. To ensure the system is feasible and flexible.
iii. To ensure the system satisfies or fulfills the users' requirements.
iv. To have an insight / visualization of how the module and sub modules interact with each other.
v. To enable early user testing.
vi. To have enhanced feedbacks to users.
vii. To encourage enhanced communication within the development organization.
viii. To reduce complexities of a development.

Prototyping does have its perils. These include:

i. Standardization- Prototypes, particularly in a high-technology prototyping environment, tend to be shaped by the tools that are available, rather than by users' needs. (*http://www.firelily.com/opinions/cycle.html*, 2/7/2004).

ii. Distraction - Work on the prototype can take attention away from the problems to be solved. (*http://www.firelily.com/opinions/cycle.html*, 2/7/2004).

iii. Seduction - Developers can be trapped in an endless loop of refinement. (*http://www.firelily.com/opinions/cycle.html*, 2/7/2004).

iv. Rejection - If the cost of implementing an idea is too high, ideas will be rejected too early in the cycle. (*http://www.firelily.com/opinions/cycle.html*, 2/7/2004).

v. Obscured historical perspective - Prototypes tend to lose the reasoning that went into them - why decisions were made, for example, or which requirements led to a set of behaviors or functions. (*http://www.firelily.com/opinions/cycle.html*, 2/7/2004).

During system testing:

i. Validation: ensures that the system has implemented all of the requirements, so that each system function can be traced back to particular requirements in the specification. Besides it makes sure that the developer is building the right product according to the specification.

ii. Verification: ensures that each function works correctly and as needed. It checks the quality of the implementation.

### 3.1.2 Evolutionary Prototyping Model

Evolutionary Prototyping Model (see figure 3.3) is a lifecycle model in which the system is developed in increments so it can be modified in response to the end user and customer feedback (*http://www.business.mnsu.edu/brownw1/458BP/RAD.pdf*, 2/7/2004).

i. Develop system concept when moving through the project

ii. Usually begin with developing the most visible aspects of the system

iii. Add and refine the prototype until it's fully complete

iv. Prototype: a working model of proposed system.

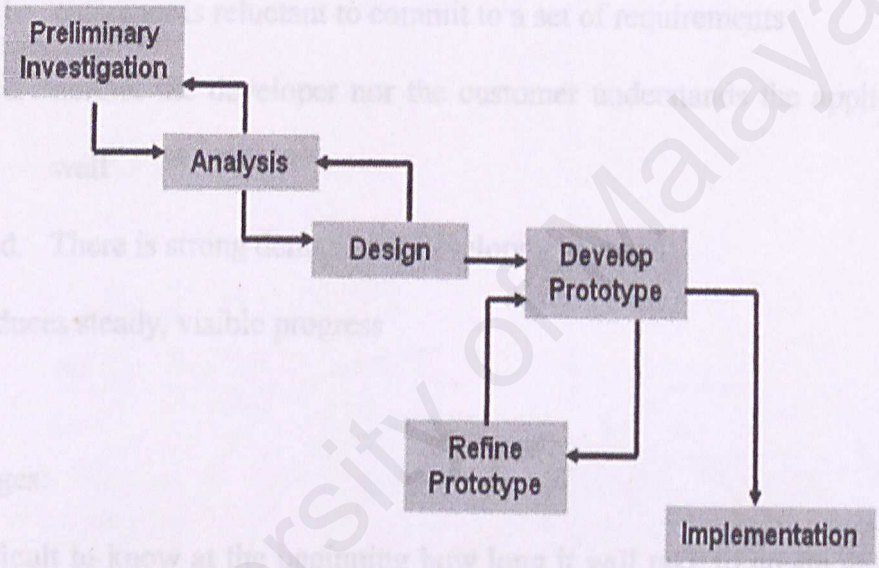



Figure 3.3: Evolutionary Prototyping Model

(*http://brahma.bpa.arizona.edu/MIS111Fall2002/docs/1*, 2/7/2004)

When to use:

i. System is poorly understood - don't fully understand the architecture

ii. Expect a lot of surprises - will focus on the *high risk segments first*

iii. Experienced developers

Key to success (*http://www.business.mnsu.edu/brownw1/458BP/RAD.pdf*, 2/7/2004):

i. Experienced developers

ii. Managing schedule and budget expectations

iii. Managing the prototyping activity itself

Advantages:

i. Especially useful when

   a. requirements are changing rapidly

   b. customer is reluctant to commit to a set of requirements

   c. neither the developer nor the customer understands the application area well

   d. There is strong demand for development speed

ii. produces steady, visible progress

Disadvantages:

i. Difficult to know at the beginning how long it will take to create an acceptable product

ii. Poor design and maintainability.

iii. Inefficiency use of prototyping time.

(*http://www.business.mnsu.edu/brownw1/458BP/RAD.pdf*, 2/7/2004)

iv. Unrealistic budget expectations.

(*http://www.business.mnsu.edu/brownw1/458BP/RAD.pdf*, 2/7/2004)

v. Can easily become an excuse to do code-and-fix development

### 3.1.3 Spiral Model

Spiral model (see figure 3.4) consists of both design and prototyping-in-stages with formal risk analysis preceding each phase, as a healthy mix of top-down and bottom-up concepts. The evolutionary process begins at the centre position and moves in a clockwise direction. Each traversal of the spiral typically results in a deliverable. This model requires *go/no go decision* at each phase. There are four recurring activities per phase (*http://www.business.mnsu.edu/brownw1/458BP/RAD.pdf*, 2/7/2004) as shown:

i. Plan

ii. Determine, goals, activities, and constraints

iii. Evaluate alternatives and risks

iv. Develop and test

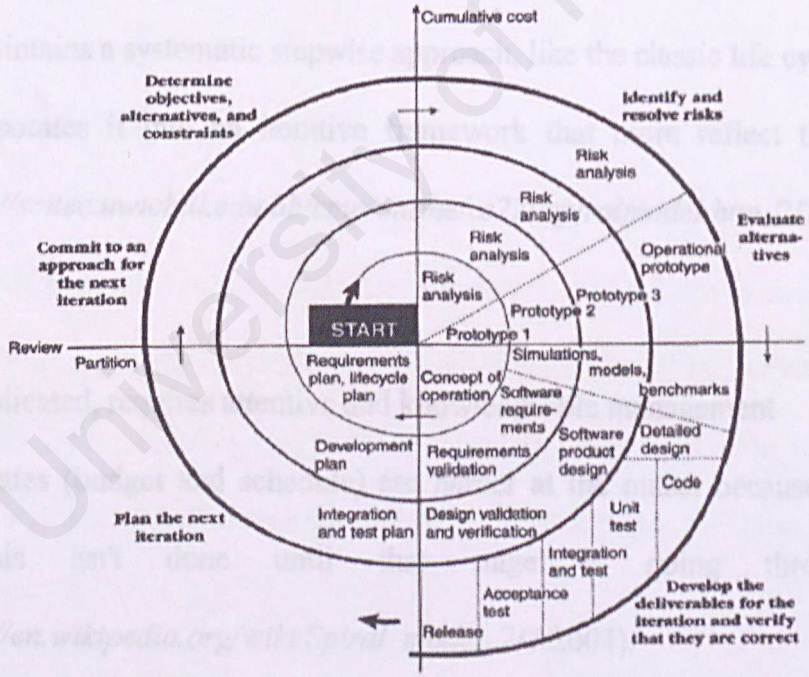



Figure 3.4 Spiral Model

(*http://www.business.mnsu.edu/brownw1/458BP/RAD.pdf*, 2/7/2004)

Strengths:

i. Can be combined with other models

ii. Risk-oriented: As costs increase, risks decrease

iii. Estimates (budget and schedule) get more realistic as work progresses, because the questions have been raised (*http://en.wikipedia.org/wiki/Spiral_model*, 2/7/2004).

iv. Works with poorly understood requirements or architecture

v. Produces system with large growth envelope

vi. Allows for midcourse correction

vii. The model uses prototyping as a risk reduction mechanism and allows for the development of prototypes at any stage of the evolutionary development (*http://scitec.uwichill.edu.bb/cmp/online/cs22l/spiralmodel.htm*, 2/7/2004).

viii. It maintains a systematic stepwise approach, like the classic life cycle model, but incorporates it into an iterative framework that more reflect the real world (*http://scitec.uwichill.edu.bb/cmp/online/cs22l/spiralmodel.htm*, 2/7/2004).

Drawbacks:

i. Complicated, requires attentive and knowledgeable management

ii. Estimates (budget and schedule) are harder at the outset because some of the analysis isn't done until that stage is going through design (*http://en.wikipedia.org/wiki/Spiral_model*, 2/7/2004).

iii. For large-scale software only

iv. For internal (in-house) software only

v. Full analysis required training, skill and considerable expense.

### 3.2 Approaches to define the requirements

A system is a collection of related parts treated as a unit where its components interact. Therefore, to develop Online Survey System (OSS), a great deal of information about/ similar to the system itself, and the procedures and methodologies involved in developing the system are rather prerequisite. Several techniques have been utilized in order to conduct the information gathering as shown below:

i. Reading materials or references from library

Related or similar reading materials such as reference books on methodology and system design can be found from the library. This type of technique is useful particularly in gathering the relevant information or data in a narrow but not less functional scope.

ii. Internet searching

Internet provides an extremely wide and powerful scope for information collecting, organizing, analyzing and summarizing. Findings such as client/server technology, existing systems, related articles and journals, programming tools, methodologies, detailed analysis, and so on are easily available with the advent of the web based search engines such as Yahoo, Mamma, and Google.

iii. Previous thesis analysis

Several similar past year thesis at FCSIT Documentation Room have been studied in order to obtain some guidelines on certain fields, such as format of the

report, criteria in each chapter, analysis methods and techniques, potentiality of amendments and improvements on the ongoing developing project and so on.

iv. Discussion

Several meeting sessions have been carried out with the supervisor (lecturer) in order to gain some ideas, advices, recommendations, and information on the requirements and proceedings of the project. The discussion likewise exists within the partnership.

v. Survey Questionnaires

Survey questionnaires were being carried out in order to gain general views and feedbacks from academicians and researchers either within the campus or from the public. The survey questionnaires had been discussed, developed, tested and printed out for photocopying among ourselves before distribution to ensure their readability and understandability. The respondents were ensured of the confidentiality of the information given. The survey results were then being collected and analyzed in meaningful forms.



## 3.3 Client/Server Architecture

### 3.3.1 Definition

A network architecture in which each computer or process on the network is either a *client* or a *server*. Servers are powerful computers or processes dedicated to managing disk drives (*file servers*), printers (*print servers*), or network traffic (*network servers* ).

Clients are PCs or workstations on which users run applications. Clients rely on servers for resources, such as files, devices, and even processing power (*http://www.webopedia.com/TERM/C/client_server_architecture.html*, 10/8/2004).

A *client* is an individual user's computer or a user application that does a certain amount of processing on its own. It also sends and receives requests to and from one or more servers for other processing and/or data (*http://www.darwinmag.com/read/090103/question11.html*, 10/8/2004).

A *server* consists of one or more computers that receive and process requests from one or more client machines. A server is typically designed with some redundancy in power, network, and computing and file storage. However, a machine with dual processors is not necessarily a server. An individual workstation *can* function as a server (*http://www.darwinmag.com/read/090103/question11.html*, 10/8/2004)

### 3.3.2 One-tier Architecture

A one-tier application is simply a program that doesn't need to access the network while running. Most simple desktop applications, like word processors or compilers, fall into this category (*http://www.javaworld.com/javaworld/jw-01-ssj-tiers_p.html*, 12/8/2004).

Advantages (*http://www.javaworld.com/javaworld/jw-01-ssj-tiers_p.html*, 12/8/2004):

i. Simplicity

One-tier applications don't need to handle any network protocols, so their code is simpler. Such code also benefits from being part of an independent operation. It doesn't need to guarantee synchronization with faraway data, nor does it need

exception-handling routines to deal with network failure, bogus data from a server, or a server running different versions of a protocol or program.

ii. Performance

The user's requests don't need to cross the network, wait their turn at the server, and then return. This has the added effect of not weighing down your network with extra traffic, and not weighing down your server with extra work.

Disadvantages (*http://www.neurauter.at//Diplomarbeit/html/node33.html*, 10/8/2004):

i. Scalability

One-tiered applications are set up for a single processor. Therefore upgrading to a larger machine is the only possibility if the actual machine can not handle the load-upcome any longer. Additionally one has to face the fact that the chosen platform can only handle data, user or transaction volume up to a certain amount. If that has been reached, the cost of porting the system to a platform able to meet the new requirements has to be paid in many respects.

ii. Portability

One-tiered applications depend a lot on their hardware based operating environment including operating systems, file structures, databases and languages. Porting the application means the same as re-writing the whole application.

iii. Lack of Flexibility

It is very difficult to modify one of the three packed application components within a one-tiered application, because it always concerns also the other two components. Therefore it is not possible to simply alter e.g. the business component to possibly meet new requirements.

### 3.3.3 Two-tier Architecture

Two-tier architecture is the quickest way of building client/server applications. In this environment, much of the processing is performed on the client workstation, using the memory space and processing power of the client to provide much of the functionality of the system.

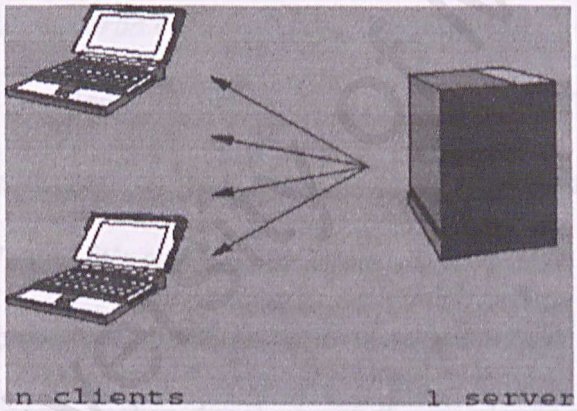



Figure 3.5: Two-tier Architecture

(*http://www.neurauter.at//Diplomarbeit/html/node34.html*, 10/8/2004)

Advantages:

i. Very effective for network programming as well as for GUI programs, in which you can allocate functionally to the host.

ii. The GUI development tools allow faster development and deployment of applications

(*http://www.neurauter.at//Diplomarbeit/html/node34.html*, 10/8/2004)

iii. Clean, modular design and less network traffic.

iv. Two-tier applications are a bit more complex to write, but most development tools are equipped with a great deal of support in their integrated development environments to facilitate rapid programming.

(*http://www.zdnetindia.com/print.html?iElementId=33892*, 12/8/2004)

v. The two tier client/server architecture is a good solution for distributed computing when work groups are defined as a dozen to 100 people interacting on a LAN simultaneously.

(http*://www.sei.cmu.edu/str/descriptions/clientserver_body.html*, 12/8/2004)

Disadvantages (*http://www.corba.ch/e/3tier.html*, 10/8/2004):

i. The complete development accumulates on the PC. The PC processes and presents information which leads to monolithic applications that are expensive to maintain. That's why it's called a "fat client".

ii. In a 2-tier architecture, business-logic is implemented on the PC. Even the business-logic never makes direct use of the windowing-system; programmers have to be trained for the complex API under Windows.

iii. Windows 3.X and Mac-systems have tough resource restrictions. For this reason application programmers also have to be well trained in systems technology, so that they can optimize scarce resources.

iv. Increased network load: since the actual processing of the data takes place on the remote client, the data has to be transported over the network. As a rule this leads to increased network stress.

v. How to conduct transactions is controlled by the client. Advanced techniques like two-phase-committing can't be run.

vi. PCs are considered to be "untrusted" in terms of security, i.e. they are relatively easy to crack. Nevertheless, sensitive data is transferred to the PC, for lack of an alternative.

vii. Data is only "offered" on the server, not processed. Stored-procedures are a form of assistance given by the database provider. But they have a limited application field and a proprietary nature.

viii. Application logic can't be reused because it is bound to an individual PC-program.

ix. The influences on change-management are drastic.

x. The 2-tier-model implies a complicated software-distribution-procedure.

xi. When the number of users exceeds 100, its performance begins to deteriorate.

(*http://www.sei.cmu.edu/str/descriptions/clientserver_body.html*, 12/8/2004)

### 3.3.4 Three-tier Architecture

The three tier architecture (also known as *three layer architecture* and also referred to as *multi tier architecture* as the middle tier may consist of several tiers by itself) emerged in the 1990s to overcome the limitations of the two tier architecture. The third tier (middle tier server) is between the user interface (client) and the data management (server) components. This middle tier provides process management where business logic and rules are executed and can accommodate hundreds of users (as compared to only 100 users with the two tier architecture) by providing functions such as queuing, application execution, and database staging. The three tier architecture is used when an

effective distributed client/server design is needed that provides (when compared to the two tier) increased performance, flexibility, maintainability, re usability, and scalability, while hiding the complexity of distributed processing from the user (*http://www.neurauter.at//Diplomarbeit/html/node35.html*, 10/8/2004).

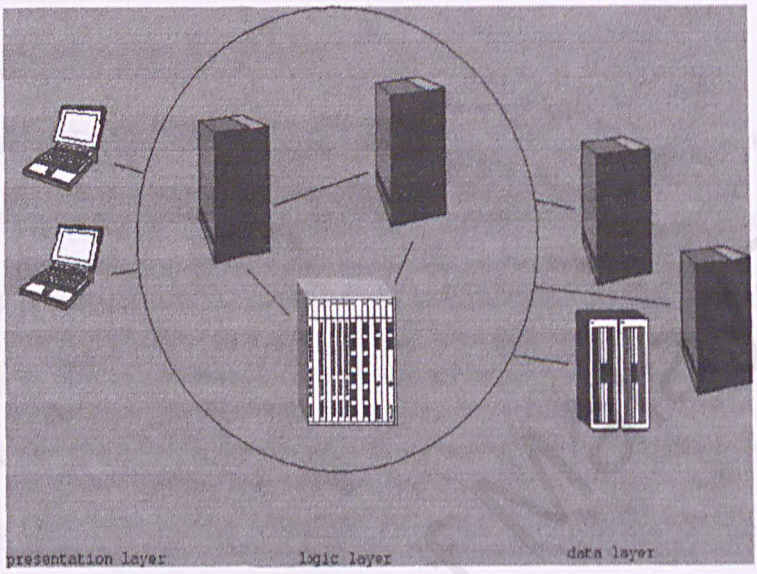



Figure 3.6: Three-tier Architecture

(*http://www.neurauter.at//Diplomarbeit/html/node35.html*, 10/8/2004)

Advantages (*http://www.neurauter.at//Diplomarbeit/html/node35.html*, 10/8/2004):

i. Object reuse

The advantages of a three-tiered environment extend beyond the life cycle of a single application. In fact, what is being built is not just an application: It is a collection of client and server modules that communicate through standardized, abstract interfaces, and when combined they behave like an integrated application system. Each module is actually a shareable, reusable object that can be included in other application systems.

ii. Easier system maintenance

Since applicational functions are isolated within small granular application objects, application logic can be modified much more easily than ever before.

iii. More effective use of data and networks

The application logic is no longer tied directly to the database structures or a particular DBMS. Individual application objects work with their own encapsulated data structures which may correspond to a database structure, or might be a data structure derived from a number of different data sources. When application objects communicate, they only need to send the data parameters as specified in the abstract interface rather than entire database records, thereby reducing network traffic. The data access objects are the only application components which interface directly with the databases. A database could be completely migrated from one DBMS to another without adversely affecting the entire application: Only the data access logic would need to be modified. This independence allows IT departments to react better to either business or technological changes.

iv. Higher developer productivity through specialization

In two-tiered methods, each programmer must develop all aspects of an application, including presentation, business, and data access logic. In three-tiered systems, programmers who have excellent user interface skills can concentrate on developing powerful presentation components, and they do not need to know about the inner workings of the applications business logic or how

the data is accessed from a database. Meanwhile database analysts who know the best ways to access data from a database do not need to be concerned.

### 3.4 Application Platform / Operating System

#### 3.4.1 Introduction

Application platform or operating system (OS) is the main control program of a computer that schedules tasks, manages storage, and handles communication with peripherals. Its main part, called the kernel, is always present. Operating system enables users to make use of the application programs by requesting through an Application Program Interface (API).Besides that, users can interact directly with the operating system through a command language or a graphical user interface (GUI). Some of the available popular application platforms are shown as follow:

#### 3.4.1.1 Microsoft Windows 2000

Windows 2000 is a true multipurpose server operating system. It is considered the easiest server operating system available. It is also one of the powerful operating system that integrates a variety of network services. The services it provides are designed to address requirements in every category and they are managed in a single way.

Pros:

i. It combines the ease-of-use of Windows 95/98 with the power and reliability of Windows 2000. the Microsoft Windows 95 operating system user interface has been integrated into Microsoft Windows 98, making the server interface easier to use and consistent. There is also a core set of services providing the platform

not only for basic management features built into the operating system but also for value-added tools and solutions for Microsoft and third parties.

ii. Windows 2000 is a platform complete enough for building and hosting web based applications. It is the best platform to publish and share information securely over Intranet and Internet. It is so reliable when an application has problem it does not fail the whole program.

iii. Windows NT Server also supports a wide range of networks protocol and Remote Access Protocol. These services, which do not require changes in client software, provide an easy and inexpensive way for deploying the powerful Virtual Private Network (VPN) and develop the distributed application.

iv. The centralized Windows 2000 security subsystem uses advanced security design features that provide an exceptional level of system security. A password filter allows system administrators to increase password strength and the encrypting password data using 128-bit cryptographically random key also increase the protection of account password information stored in the registry by the Security Account Manager (SAM).

v. Windows 2000 also enables the capabilities of integrating application on a single computer or ever across multiple computers.

Cons:

i. User will have to buy separate software in order to set up an e-mail server.

ii. Insignificant changes to one of the configuration of Windows 2000 will probably request or requires a shut down and reboot in order to make the changes take effect.

iii. The ongoing maintenance and support requirements of Windows 2000 can make them much more costly to run.

### 3.4.1.2 Windows XP Professional

Windows XP Professional is an operating system that based on 32-bit computing architecture and a fully protected memory model. Windows XP Professional Edition is designated by Microsoft as replacement for the Windows NT and Windows 2000. It offers full User Management and Security with local Security Policies and Local Logon Scripts. It has additional features designed for businesses such as the ability to join a domain and dual-processor support. It is the best desktop operating system for businesses of all size and for users who demand the higher computing power.

Pros:

i. Windows XP more reliable, it is more easily recover from system problems.

ii. Remote Assistance, which allows user to have a friend or IT professional that is also running Windows XP remotely control user's computer to demonstrate a process or help solve a problem.

iii. Encrypting File System provides a high level of protection of with a randomly generated key.

iv. Windows Messenger provides an easy way to communicate and collaborate in real time on user's computer.

v. Windows XP is easy to use due to its intuitive, task-based design.

vi. System Restore features enable user to revert the system to a previous state when something goes wrong in computer.

Cons:

i. Sharing XP with more than one machine in the house is not acceptable.

ii. User has to reactivate XP if a serious upgrade of PC's internal components is undertake due to Microsoft uses a complicated calculation to tag XP to a specific machine.

iii. Some software and hardware won't operate under XP without updated patches or drivers.

### 3.4.1.3 UNIX

UNIX is a powerful computer operating system originally developed at AT&T Bell Laboratories. It is very popular among the scientific, engineering, and academic communities due to its multi-user and multi-tasking environment, flexibility and portability, electronic mail and networking capabilities, and the numerous programming, text processing and scientific utilities available. It has also gained widespread acceptance in government and business.

Pros:

i. It is a powerful and mature OS and network-based platform.

ii. Stability and reliability.

iii. Less vulnerable to security flaws and hacker attacks.

iv. Available for almost any hardware platform.

Cons:

i. Server configuration and maintenance requires special knowledge and skills.

ii. Non-sensible syntax.

iii. Not user friendly, confusing for beginners.

iv. It need very powerful workstations and therefore not cost effective.

### 3.4.1.4 Linux

Linux is an operating system that was initially created by Linus Torvalds, at the University of Helsinki in Finland. The kernel, at the heart of all Linux systems, is developed and released under the GNU General Public License and its source code is freely available to everyone. It is this kernel that forms the base around which a Linux operating system is developed. There are now literally hundreds of companies and organizations and an equal number of individuals that have released their own versions of operating systems based on the Linux kernel.

Pros:

i. Linux source code is freely distributed. Ten of thousands of programmers have reviewed the source code to improve performance, eliminate bugs, and strengthen security. No other operating system has ever undergone this level of review. (*http://webpedia.internet.com/TERM/I/Internet.html*, 15/8/2004)

ii. Linux run on a wide range of hardware. Most Linux systems are based on standard PC hardware, and Linux supports a very wide range of PC devices.

iii. Linux is exceptionally stable. Properly configured, Linux systems will generally run until the hardware fails or the system is shutting down. Continuous up-times

of hundreds of days (up to a year or more) are not uncommon. (*http://webpedia.internet.com/TERM/I/Internet.html*, 15/8/2004)

iv. Linux has the tools and applications you need. Programs ranging from the market-dominating. Apache web server to the powerful GIMP graphics editor are included in most Linux distributions. Free and commercial applications meet are available to meet most application needs. (*http://webpedia.internet.com/TERM/I/Internet.html*, 15/8/2004)

v. Linux has a low total cost of ownership. Although the Linux learning curve is significant, the stability, design, and breadth of tools available for Linux result in very low ongoing operating costs.

vi. It is developed under the GNK General Public License; therefore its source code is freely available to everyone. (*http://techweb.cimp.com/nc/816/816w2.html*, 15/8/2004)

vii. It has highly cost-effective ability to scale the size of the site as traffic grows.

Cons:

i. It is developed by people worldwide; therefore it is lack of properly organized support.

ii. Driver availability is another hurdle. Though more and more hardware vendors are supplying Linux-compatible drivers, finding a driver for a particular component can be challenging, if not impossible.

iii. It is more difficult to find staff talented in any particular arbitrary combination of Linux/ Apache/ JRun/ Mod_pal/ PHP/ Locomotive or whatever than it is to find staff talented in NT/ US/ COM

iv. It is inherently unsafe because every malicious cracker in the universe has the source code to the site that we are developing.

### 3.5 Programming Language

Programming languages is a language used to write instructions for the computer. It lets the programmer express data processing in a symbolic manner without regard to machine-specific details. Some of the available popular programming languages are shown as follow:

#### 3.5.1 Hypertext Markup Language (HTML)

HTML is a layout language. It contains commands that, like a word processor, tell the computer – in a very loose sense – what the content of the document is. Using HTML, we can tell the computer that a certain document contains a paragraph, a bulleted list, a table, or an image. The HTML rendering engine is responsible for displaying the text and images on the screen. The difference between HTML and word processors work with proprietary formats, therefore one word processor cannot directly read another word processor's file format – they usually need a special program, called an import/export filter, to transfer one file format to another.

In contrast, HTML is an open, worldwide standard. If you create a file using the commands available in version 3.2 or earlier, it will display on almost any computer with any operating system – anywhere in the world.

Why HTML:

i. It provides millions of people with access to information online that they could not or would not have seen any other way.

ii. HTML is the first easy method for non-programmers to display text and images on-screen without limiting the audience to those who own or have access to the same program (or a viewer) that the author used to create the content.

iii. In addition, browsers are universal content viewers and HTML is the universal file format which helps universalizing the display of any output of information.

The limitation of HTML

i. Plain HTML has no way to specify the exact position of content on a page, either horizontally, vertically, or along the z-axis, which controls the layers in which objects appear.

ii. HTML is not a programming language, thus it has no decision-making capabilities.

iii. HTML is a fixed or static language. Therefore, the limited command set forces developers to build proprietary extensions to perform more advanced functions.

### 3.5.2 PHP Hypertext Preprocessor (PHP)

PHP is a widely used open-source programming language used primarily for server-side applications, to develop dynamic web content. (*http://www.wordiq.com/definition/PHP*, 15/8/2004)

Pros (*http://www.wordiq.com/definition/PHP*, 15/8/2004):

i. It can be seen as an alternative to Microsoft's ASP/VBScript/JScript system, Sun Microsystems' JSP/Java system, and to the CGI/Perl system.

ii. Its ease of use and similarity with the most common structured programming languages, most notably C and Perl, allows most experienced programmers to start developing complex applications with a minimal learning curve. It also enables experienced developers to get involved with dynamic web content applications without having to learn a whole new set of functions and practices.

iii. It is more than just a scripting language. PHP can be used to develop GUI applications, and it can be used from the command line just like Perl or Python can be.

iv. PHP allows, among other things, easy interaction with a large number of relational database systems (Oracle, DB2, MySQL, PostgreSQL, etc.), while maintaining a simple and straightforward syntax.

v. PHP runs on every major operating system, including Unix, Linux, Windows, and Mac OS X and can interact with all major web servers.

vi. PHP is the result of the collective efforts of many contributors. It is licensed under a BSD-style license, the PHP license. PHP 4 and 5 engines are powered by Zend Technologies.

vii. PHP has a wide variety of extensions such as support for the Windows API, process management on Unix-like operating systems, cURL support, ZIP, gzip and bzip2 support. Some of the more unique features are PDF generation, Macromedia Flash generation (on the fly), integration with IRC and much more besides.

### 3.5.3 Active Server Page (ASP)

ASP (Active Server Pages) is a technology developed by Microsoft. Pages using ASP are primarily developed in JavaScript or VBScript and are integrated into the HTML of your Web pages. The ASP code is compiled on-the-fly by the server and the resulting output is standard HTML. By using ASP, Web pages can be dynamic, full of ever-changing content, and browser independent.

Pros (*http://les1.man.ac.uk/course/asp/material/aspcourse.ppt*, 8/3/2005):

i. Easy to develop applications (When deadlines are tight)

ii. No extra software required (Comes with web server)

iii. Powerful and flexible (Excellent database integration)

iv. Browser independent (All server side)

Cons (*http://www.vbip.com/books/186100222X/chapter_222x_04.asp*, 8/3/2005):

i. Inherent limitations of scripting languages

ii. Insecure nature of text-based scripting

iii. Performance of interpreted scripting

iv. Limited transactional participation

### 3.5.4 Java Server Page (JSP)

Java Server Pages (JSP) technology is based entirely upon Sun's popular Java programming language. Behind the scenes, JSP pages are dynamically assembled into Servlets, which are simply Java classes. This means JSP supports the same modularity,

reusability, platform-independence and access to Java APIs that Java programming supports. This provides developers great advantages to rapidly develop and easily maintain information-rich, dynamic web pages in Java in a more relaxed, script-like environment.

Pros:

i. JSP is easy and convenient to use.

ii. JSP technology is Write Once Run Anywhere.

iii. JSP pages can be moved easily across platforms, and across web servers, without any changes.

iv. JSP separate the static presentation templates from dynamic content by encapsulating it within external JavaBeans components.

v. Dynamic content of JSP can be served in a variety of formats such as HTML/DHTML, WML or XML.

vi. JSP Completely leverages the Servlet API.

vii. JSP technology brings the "Write Once, Run Anywhere" paradigm to interactive Web pages. JSP pages can be moved easily across platforms, and across web servers, without any changes.

(*http://java.sun.com/developer/onlineTraining/JSPIntro/contents.html#JSPIntro0*, 15/8/2004)

Cons:

i. JSP files often utilize JavaBeans components and this can introduce particular security risks.

ii. JSP documentation requires an excessively broad knowledge of other Internet technologies.

iii. JSP forces developer into an all-Java programming model because it can make native calls only to Java classes or JavaBeans, which are written only in Java.

iv. JSP delivers poorer performance compared to Microsoft's ASP technology on Windows platforms.

### 3.6 Scripting Language

#### 3.6.1 VBScript

VBScript was created by Microsoft to use either as a client-side scripting language for the Microsoft Internet Explorer (versions 3.0 and later) or as a server-side scripting language with the Microsoft Internet Information Server (versions 3.0 and later).

Pros(*http://www.windowsitpro.com/WindowsScripting/Article/ArticleID/24370/24370.html*, 8/3/2005):

i. VBScript's native COM support makes working with COM objects as easy as COM gets.

ii. WSH, which includes VBScript and JScript, is a core component of the Windows platform.

iii. You can sign WSH 5.6 scripts and control their execution through policies.

iv. VBScript is a small, simple, and easy-to-read language, which can make it less intimidating to nonprogrammers.

v. VBScript is a subset of the Visual Basic (VB) language, which means you can leverage your previous VB experience—and improve your VB skills in the process.

Cons(*http://www.windowsitpro.com/WindowsScripting/Article/ArticleID/24370/24370.html*, 8/3/2005):

i. VBScript lacks support for some data types, which makes it unsuitable

### 3.6.2 JavaScript

The JavaScript language was developed by the Netscape Communications Corporation and is a trademarked name. It is a cross-platform, object-based scripting language that was originally designed for use in Netscape Navigator. Indeed, versions 2.0, and later, of Navigator can interpret JavaScript statements that are embedded within HTML code.

Pros (*http://www.mediacollege.com/internet/javascript/pros-cons.html*, 8/3/2005):

i. Speed. Being client-side, JavaScript is very fast because any code functions can be run immediately instead of having to contact the server and wait for an answer.
ii. Simplicity. JavaScript is relatively simple to learn and implement.
iii. Versatility. JavaScript plays nicely with other languages and can be used in a huge variety of applications. Unlike PHP or SSI scripts, JavaScript can be inserted into any web page regardless of the file extension. JavaScript can also be used inside scripts written in other languages such as Perl and PHP.
iv. Server Load. Being client-side reduces the demand on the website server.

Cons (*http://www.mediacollege.com/internet/javascript/pros-cons.html*, 8/3/2005):

i. Security. Because the code executes on the users' computer, in some cases it can be exploited for malicious purposes. This is one reason some people choose to disable JavaScript.

ii. Reliance on End User. JavaScript is sometimes interpreted differently by different browsers. Whereas server-side scripts will always produce the same output, client-side scripts can be a little unpredictable. Don't be overly concerned by this though - as long as you test your script in all the major browsers you should be safe.

### 3.7 Web Server

#### 3.7.1 Apache

Apache, like Linux, is a piece of open-source software. It's maintained by a group of programmers who create the software for the thrill of it - not for any expected financial gain. Apache was born in early 1995, as free Web server software based around NCSA httpd 1.3, which was the most popular Web server of the day, and a bunch of software patches. From that it earned its moniker, which stands for "A PAtCHY server." Since then, it has been completely re-written, and has become the most popular WWW server on the Internet.

Apache lends itself particularly well to projects that are heavily Java based. It offers superior handling of the Java Database Connectivity (JDBC) application program interface (a program which allows Java-based services to access information stored in SQL-compliant databases).

Pros:

i. Open source updates.

ii. Popular. Apache is the most-used Web server software package in the world

iii. Free. The software is free. It's hard to beat that price.

iv. Multi-platform support. Apache can be used on systems that have 80x86-series (i.e. Intel) processors running either Linux or NT as an OS, or on other computers running a Unix-type OS on a different processor.

v. Provide support for Secure Sockets Layer (SSL) without any modifications to the core.

vi. It's constantly being updated and functionality added.

vii. Code can be easily modified to meet specific needs and fast problem responds.

Cons:

i. Apache runs faster on the Linux machine. This means that if you decide to go with Apache, you should also use Linux to get maximum performance.

ii. No Support. Apache's developers do not provide any type of support for their product.

iii. Does not offer easy-to-use management tools and user interfaces.

iv. Multiple modules and run- time directives increase its complexity.

### 3.7.2 Internet Information Services 6.0 (IIS)

Internet Information Services (IIS) 6.0 is a powerful Web server that provides a highly reliable, manageable, and scalable Web application infrastructure for all versions of Windows Server 2003. IIS helps organizations increase Web site and application

availability while lowering system administration costs. IIS 6.0 supports the Microsoft Dynamic Systems Initiative (DSI) with automated health monitoring, process isolation, and improved management capabilities. IIS 6.0 leverages the latest Web standards like Microsoft ASP.NET, XML, and Simple Object Access Protocol (SOAP) for the development, implementation, and management of Web applications.

Pros:

i. Has good integration with Performance Monitor, which provides for easy access to extensive usage statistics.

ii. The service of IIS 6.0 is installed in a highly secure and "locked" mode and it serves only static content by default to increase security.

iii. Configuration of IIS 6.0 becomes easier by using IIS Manager, administration scripts, or by directly editing the IIS plain-text configuration file.

iv. Support for the latest Web standards including ASP.NET, XML, SOAP and Internet Protocol Version 6.

v. New request-processing architecture prevents one application or Web site from stopping another when errors occur.

Cons:

i. IIS is only available for Windows.

ii. Closed source. Any access to the source code to make change is prohibited.

### 3.8 Web Browser

#### 3.8.1 Internet Explorer 6.0

Internet Explorer 6 is a set of core technologies in Microsoft Windows XP Home Edition and Windows XP Professional operating systems that provides enhanced privacy

features and a flexible and reliable browsing experience for users of Windows XP, Windows Millennium Edition (Windows Me), Windows 2000, Windows 98, and Windows NT® 4.0 with Service Pack 6a or later.

Whether you are a home user browsing content or getting e-mail on the Web, an IT administrator deploying and maintaining a rich set of Windows Internet technologies, or a Web developer creating Web content, Internet Explorer 6 gives you the freedom to experience the best of the Internet.

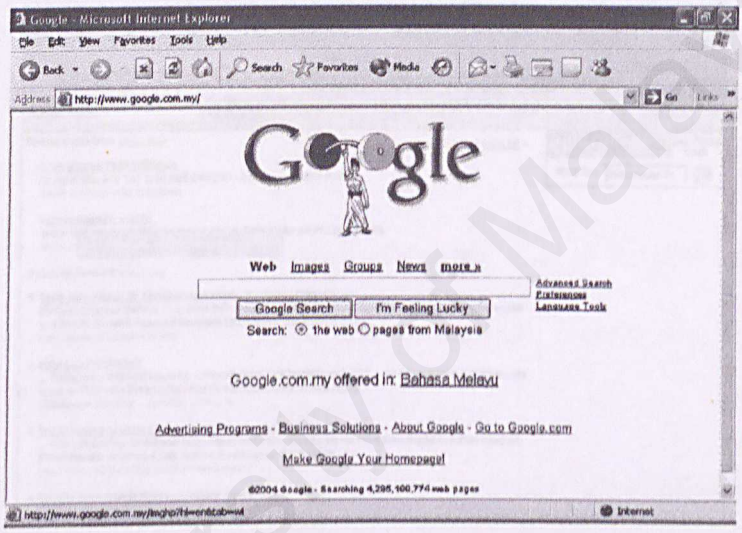



Figure 3.7: Internet Explorer Screenshot

Pros:

i. It incorporates media player in its "media bar" for playing videos and music.

ii. IE6 has good support for XML and XHTML.

iii. IE comes with a lot of plug-in ready installed.

iv. Fault collection services of IE 6.0 help identify potential problems that need to be fixed in future Internet Explorer Service Packs.

Cons:

i. IE6 does not support for java

ii. IE6 is not available on Linux or UNIX.

iii. Supports for some picture formats such as .png are still poor.

### 3.8.2 Netscape 7.2

Netscape has updated its Internet suite to version 7.2. This new version offers many improvements since the previous release, including improved standards support and better control over popup windows. It is derived from Mozilla 1.7.

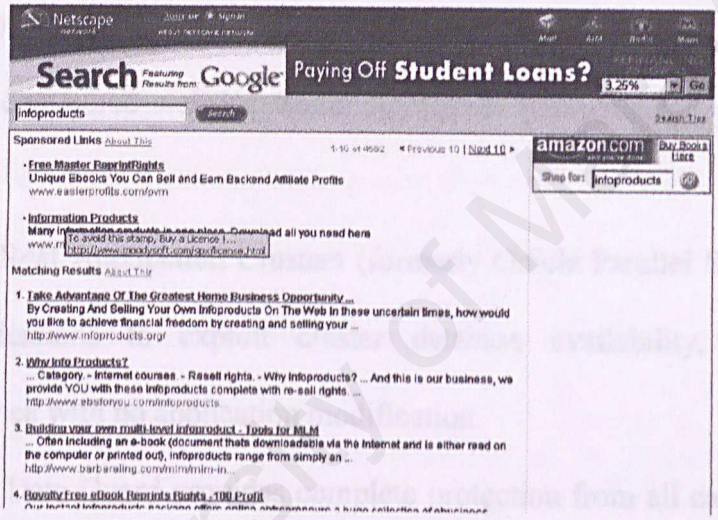



Figure 3.8: Netscape Screenshot

Pros:

i. Popup Window Controls have been improved to block mouseover pop-ups and limit the number of pop-ups when popup window controls preference is set to off.

ii. Password Manager allows you to display saved passwords.

iii. vCard support in Netscape Mail.

iv. Improvements to Palm Sync.

v. Table Editing controls in Composer.

vi. New Macromedia® Flash 7 plug-in for Windows.

vii. Improvements in browser rendering speed and application start-up.

viii. Improvements in standards support.

Cons:

i. Message templates are weak.

ii. Custom message filters are not flexible enough.

### 3.9 Database Server

#### 3.9.1 Oracle 9i

Oracle 9i is a powerful DBMS for reliable and high capacity Internet application, data warehouse or e-commerce website. Some significant improvements in Oracle 9i are shown as follow:

i. Oracle9i Real Application Clusters (formerly Oracle Parallel Server) enable all the applications to exploit cluster database availability, scalability and performance with no application modification.

ii. Oracle 9i Data Guard provides complete protection from all causes of data loss by delaying the application of changes sent to the standby database site.

iii. Flashback Query provides user-level error correction by allowing any user to go 'back in time' to access and bring forward previous version of information.

iv. With Oracle 9i, applications can support all languages within single database due to fully support for Unicode 3.0.

Pros:

i. Character Set Scanner Utility detects the possible migration problems.

ii. Support for multi-platform.

iii. Treats XML as a native datatype in database.

iv. Secure, reliable and portable.

Cons:

i. Expensive in maintenance contact.

### 3.9.2 Microsoft SQL Server 2000

Microsoft SQL Server 2000 is designed to work effectively as (*http://doc.ddart.net/mssql/sql2000/html/architec/8_ar_cs_20yt.htm*, 20/8/2004):

i. A central database on a server shared by many users who connect to it over a network. The number of users can range from a handful in one workgroup, to thousands of employees in a large enterprise, to hundreds of thousands of Web users.

ii. A desktop database that services only applications running on the same desktop.

Pros (*http://doc.ddart.net/mssql/sql2000/html/architec/8_ar_cs_20yt.htm*, 20/8/2004):

i. Microsoft SQL Server 2000 is capable of supplying the database services needed by extremely large systems.

ii. Large servers may have thousands of users connected to an instance of SQL Server 2000 at the same time. SQL Server 2000 has full protection for these environments, with safeguards that prevent problems, such as having multiple users trying to update the same piece of data at the same time.

iii. SQL Server 2000 allocates the available resources effectively, such as memory, network bandwidth, and disk I/O, among the multiple users.

iv. Multiple instances of SQL Server 2000 can be run on a single computer.

v. SQL Server 2000 applications can run on the same computer as SQL Server 2000. The application connects to SQL Server 2000 using Windows Interprocess Communications (IPC) components, such as shared memory, instead of a network. This allows SQL Server 2000 to be used on small systems where an application must store its data locally.

vi. SQL Server 2000 can configure itself dynamically to run efficiently with the resources available on a client desktop or laptop computer, without the need to dedicate a database administrator to each client. Application vendors can also embed SQL Server 2000 as the data storage component of their applications.

Nevertheless Microsoft SQL Server 2000 owns several disadvantages as it does not have cluster scalability, the cost in setting the system is relatively higher and it is difficult to administer.

### 3.9.3 Microsoft Access 2003

Microsoft Access 2003 provides a powerful set of tools that are sophisticated enough for professional developers, yet easy to learn for new users. Create or use powerful database solutions that make organizing, accessing, and sharing information easier than ever.

Pros(*http://www.amazon.com/exec/obidos/ASIN/B0000AZJV4/102-2610395-6721706*, 8/3/2005):

i. Supports a variety of data formats, including Extensible Markup Language (XML), OLE, Open Database Connectivity (ODBC), and Microsoft Windows SharePoint Services.

ii. Access data from multiple databases in forms, reports, and data access pages, linking tables from other Access databases, Microsoft Excel spreadsheets, ODBC data sources, Microsoft SQL Server databases & other sources.

iii. Stored Procedure Designer creates & modifies procedures stored in SQL Server, without requiring you to learn Transact-SQL.

iv. Quickly find tables, queries, forms or reports that depend on a particular database object update properties automatically.

# CHAPTER 4 - SYSTEM ANALYSIS

## 4.1 System Requirement Analysis

Requirement analysis is an important process to determine the system being built in order to meet the customer's requirements. There are two types of requirement, namely functional requirement and non-functional requirement.

## 4.2 Functional Requirement

Functional requirement is a statement of service or functional that a system should provide the system read to particular inputs and how the system should behave in particular situation. This Online Survey System consists of 3 sections namely user, respondent and administration.

### 4.2.1 User section

i. Registration module

The module implements a password protected web site for authorize access for valid user. The user must register before they start to use the system. The system will validate user's password before they log in to the system.

ii. Question designing module

The module allows the user to do specific function such as:

i. Create a new question and add it to database.

ii. Editing the existing questions.

iii. Delete questions for own design survey only.

iv. Send invitation mail to the respondents and attach the hyperlink in the email to direct them to the survey.

iii. Database management module

i. Users can create their own respondent list to facilitate sending survey. They can add, edit, or delete the respondent in database.

iv. Report generator module

i. Able to generate analysis report by using the existing data.

### 4.2.2 Respondent section

i. Survey answering module

They can direct to the survey by clicking on the hyperlink in the email. They can submit the survey form easily by just one mouse click.

### 4.2.3 Administration section

The module allows the administrator to manage the user, respondent and survey. The system can add, edit user details or delete user from the system. The same functions are required for managing the respondent and survey.

## 4.3 Non-functional Requirement

Non-functional requirement will define the constraints imposed upon the Online Survey System. It will place restrictions or the freedom of design. Besides, it also lists the

product and standard process, which must be followed. Non-functional requirement has to be defined as it will clearly affect the operations of the system.

### 4.3.1 Reliability

Reliability extends to which a system can be expected to perform its intended function with required precision and accuracy. Thus, the system should be reliable in performing its functions and operations correctly. A reliable system supposes not to produce malicious or costly failures when it is in use. It means that the rate of failure occurrence must be at the manageable level.

### 4.3.2 Security

The system shall be secure from unauthorized access. All the data in the database shall be kept away from authorized users. Registered users are required to key in their password in order to access the survey data. This can protect the survey data.

### 4.3.3 Maintainability

This application is designed so that the effort required to maintain, locate and fix an error in the program is as minimum as possible. Adequate comment is required to ensure that the application is easy to maintain. The system must be easy to upgrade and modify in order to accommodate future enhancement in order to fulfill user requirements of their needs.

### 4.3.4 Robustness

Robustness refers to the ability of the system to continue in operation despite facing unexpected problems. Online survey system is able to process unanticipated errors by having validation for the input field on the client side before it is sent to the server and saved in database. For instance, a user may accidentally key in alphabets instead of numeric for date. Thus, the system can validate this input before sending to the server. When error is detected, the system will prompt an error message to the user.

### 4.3.5 Performance

The system must have ability to generate an accurate analysis report from the survey data. The system must able to handle the respondents as many as possible at the same time. It is also a critical to make the response time for the system as fast as possible. The display time for the survey questions must as short as possible. If the download time is too slow, the respondents will not be interested in doing the survey form anymore.

### 4.3.6 On time

The system should be developed according to the schedule so that the final product can be delivered before the deadline. All the requirements and system analysis should be completed in time.

### 4.3.7 Portability

The system should be portability enough so that it can be used in different types of platform and enable anyone to access to the web site anytime and anywhere.

### 4.4 Methodology Choosing and Justification

After having brief studies on three (3) process models that under consideration in Chapter 3, Waterfall Model with Prototyping is chosen based on its several convincing reasons that supports and routing throughout the whole developing progress of OSS system. There are 5 main stages that define for the entire project development life cycle. They are explained as follow:

i. Theoretically, one development stage should be completed before the next begins. In overall, this proposed methodology presents a very high-level view of what goes on during development, and it suggests me the sequence of events that I expect to encounter. However, in practice, these stages overlap among on and another, and feed information to each other. For example, during design stage, problems with requirements definition would be identified; during coding stage, problems related to system design would be encountered. Therefore, it is more suitable to say that an application system development process is not a simple linear model but involves a sequence of repetition of the activities.

ii. Associated with each process activity will be milestone and deliverables, so that I can use the model to estimate how close the project is to complete at a given point in time.

iii. In addition, this model is expected to help me lay out what the system needs to do in an order way. Its straightforwardness and simplicity make it easy to explain to others who are maybe not very familiar with the OSS system development.

iv. Prototyping conducted concurrently with the requirements analysis and definition stage in the initial stage of the development life cycle, effectively helps

me ensuring the developing system time to time that it always meets its definition of needs and is feasible enough. If any error or inappropriate concept and definition found during the early stage, correction and improvement will take place immediately. It is therefore able to avoid or at least reduce cost of changing the whole testing stage when everything almost comes to the final stage.

## 4.5 Client / Server Architecture Choosing and Justification

Three-tier architecture was chosen in this project due to its most practical and suit the system's tremendously. It has many advantages compare with one-tier architecture and two-tier architecture.

i. Separating of the functionality and data layer make it easier to implement.

ii. The added modularity makes it easier to modify without affecting other tiers

iii. The ability to support transaction by a huge number of users on the server at the same time

## 4.6 Development Tools Choosing and Justification

### 4.6.1 Application Platform / Operating System

As a result of reviewing four (4) application platforms/ operating systems in Chapter 3, namely Microsoft Windows 2000, Windows XP Professional, UNIX and Linux, Windows XP Professional is chosen since it is an evolution platform of Windows XP Home Edition as well as of the Microsoft Windows 2000 Family. Besides it is much easier to manage as compared to UNIX and Linux.

### 4.6.2 Programming Language

Active Server Page (ASP) is chosen under much consideration due to its flexibility and usability as well as its feasibility to merge with scripting languages such as VBScript and JavaScript.

### 4.6.3 Web Server

Internet Information Server 6.0 (IIS 6.0) has been chosen as a web server for this project due to several reasons:

i. Easy to install and uninstall.

ii. Accessible since most of the browsers can work with it.

iii. Provides capabilities for secure transaction with the Secure Socket Layer (SSL) support and also authentication.

iv. It is equipped within the application platform / operation system that will be used, thus ease the development processes.

### 4.6.4 Web Browser

Internet Explorer 6.0 chosen as the main web browser for uploading the system to be built due to its availability in the operating system being chosen and its worldwide use. Besides, any system that runs in the IE 6.0 can perform well in most of the web browsers, such as Netscape.

### 4.6.5 Database Server

Microsoft Access 2003 is chosen based on its noticeable strong points and it is less expensive in maintenance aspects as compared to Oracle 9i and Microsoft SQL Server 2000.

## 4.7 Development Requirement

### 4.7.1 Hardware Requirement

Table 4.1 Hardware Requirement

| Server | Client |
|---|---|
| i. Intel Pentium III 450 MHz or above.<br>ii. RAM at least 128MB or above<br>iii. 20GB Hard Disk or above<br>iv. 56K Modem / Network card NIC 10/100<br>other standard peripherals | i. Intel Pentium III 450 MHz or above<br>ii. RAM at least 128 MB or above<br>iii. 2.0GB Hard Disk or above<br>iv. 56K Modem / Network card NIC 10/100<br>v. other standard peripherals |

### 4.7.2 Software Requirement

Table 4.2 Software Requirement

| Server | Client |
|---|---|
| i. Microsoft Windows XP Professional<br>ii. Internet Explorer 6.0<br>iii. IIS 6.0<br>iv. Microsoft Access 2003<br>v. Web technology: ASP<br>Scripting language: VBScript, JavaScript | i. Microsoft Windows 98 or later<br>ii. Internet Explorer 5 and above |

# CHAPTER 5 SYSTEM DESIGN

## 5.1 Introduction

The system design is the real-world solution to the business problem domain, and represented by a class diagram. It is built by reiteratively adding the real-world constraints to the idealized object model. A high level system design is the first arbitrarily few passes before the full, or detailed, system design is refined (*www.carolla.com/glossary.html*, 26/9/2004). System design includes the following issues:

i. System Architecture Design

ii. System Functionality Design

iii. User Interface Design

iv. Database Design

## 5.2 Overview of System Architecture

System architecture becomes essential when a number of subsystems are being integrated. It involves identifying the major components of the OSS and the communications between these components. Integration is not simply concerned with the communication between the subsystems but also any conflicting assumptions inherent in each system. There are few system architectures available now which are: Two-tier architecture and Three-tier architecture.

The conceptual architecture of the three-tier application applies when we split an application across three tiers are split into three logical components of the application: user interface, computational logic and data storage. In reality, the three-tier Web

applications generally consist of a Web browser for the user interface, a Web server connected to a "middle tier" application, and a persistent store that is frequently a relational database. (Refer to Figure 4-1). 3-tier allows any part of the system to be modified without change to other two part of the system. The main purpose of having three-tier architecture is to assign main functionality to each tier to ensure no function overlapped. Different people could handle each tier using different languages. Therefore, whenever there is error or system fault occurs, the problems can be detected and fixed easily without interrupting other tier.

The client-server architecture, which shows how data and processing are distributed across a range of processor, has three major components:

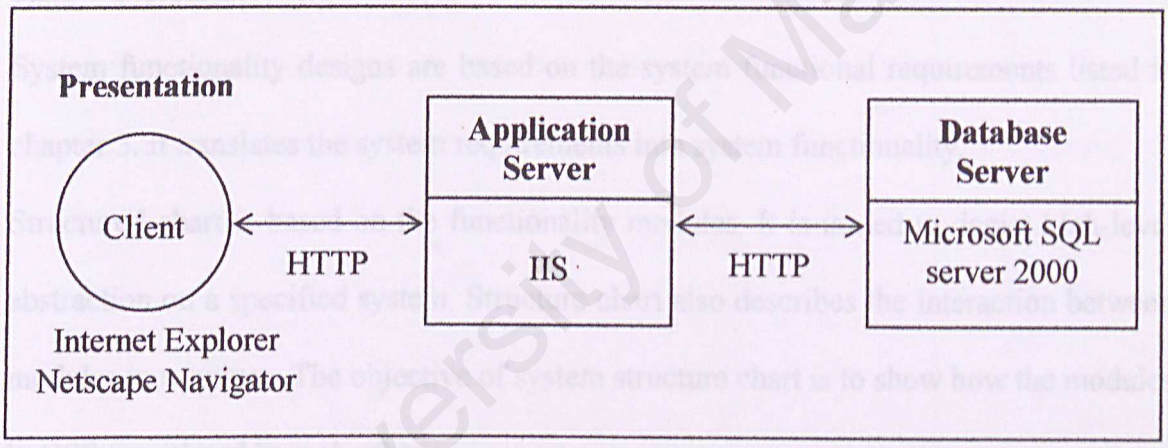



Figure 5.1: Three-tier Client Server Architecture

The first tier is a client where all the application needed is organized. The client-tier will apply the browser like Internet Explorer and Netscape Navigator. It's simply for running the presentation software. To display the user interface (web page) to the user, the browser in this system is used.

The application server is the middle tier in OSS. Internet Information Server (IIS) in this system is responsible to manage the data. IIS interact with database sever to process the request from client and return the required result in the web page format.

The MS SQL server 2000 is acts as database server in OSS. It is responsible to maintain the data repository. Three-tier architecture in this system is used to allow the information transfer between the database server and web server to be optimized. In handle information retrieval from the database, the query is used. The results will then be passed back to the application server.

## 5.3 System Functionality Design

### 5.3.1 System Structure Charts

System functionality designs are based on the system functional requirements listed in chapter 3. It translates the system requirements into system functionality.

Structured chart is based on the functionality modules. It is issued to depict high-level abstraction on a specified system. Structure chart also describes the interaction between modules in a system. The objective of system structure chart is to show how the modules in OSS are related to each other.

OSS consists of three major parts, which are the Administration Section, the User Section and the Respondent Section.

The OSS is decomposed to the following modules:

1. Administration section

   Data management module

   i. Manage user

   ii. Manage respondent

iii. Manage questionnaire

2. User Section

i. Registration module

ii. Question designing module

iii. Survey distribution module

iv. Data management module

3. Respondent Section

i. Survey answering module

Each module is further divided into sub-modules. By using graphical representation rather than process or narrative, it is very effective in presenting the system structure.

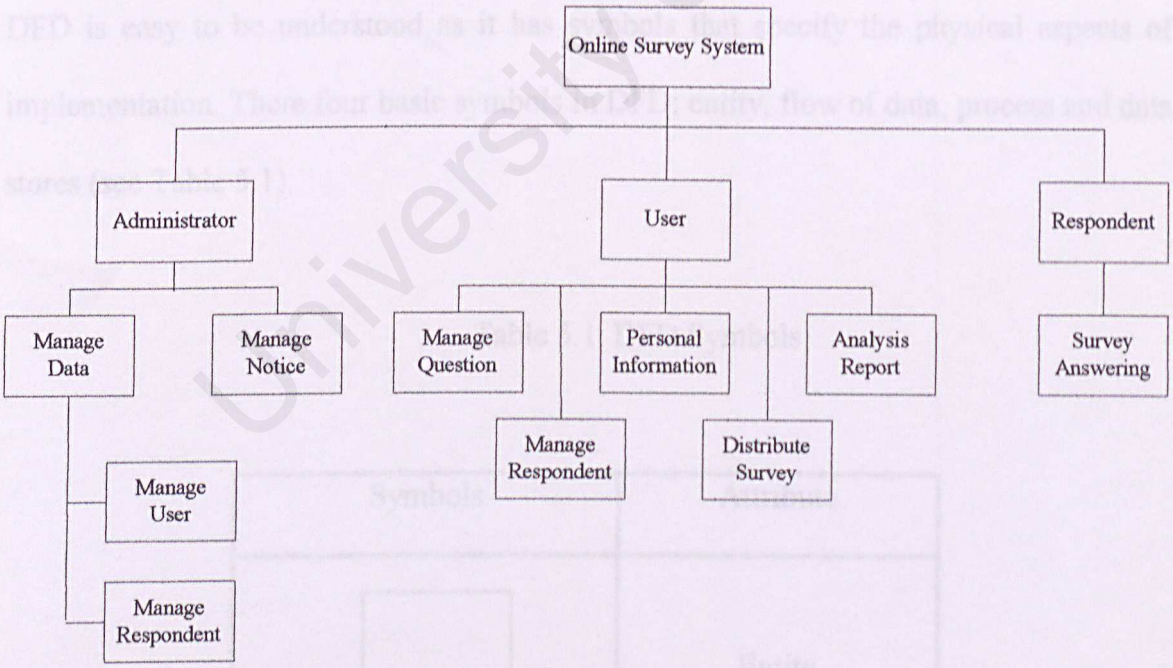



Figure 5.2: OSS Structured Chart

**Data Flow Diagram (DFD)**

**5.3.2.1 Introduction**

A data flow diagram (DFD) is a tool that depicts the flow of data through a system and the work or progressing performed by that system. Data Flow Diagram (DFD) is also a method used to graphically characterize data processes and flows in OSS. DFD will depict the overview of the system inputs, process and outputs.

The advantages of using DFD are:

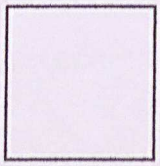
i. Provide better understanding of the interrelatedness of modules and sub modules of OSS.

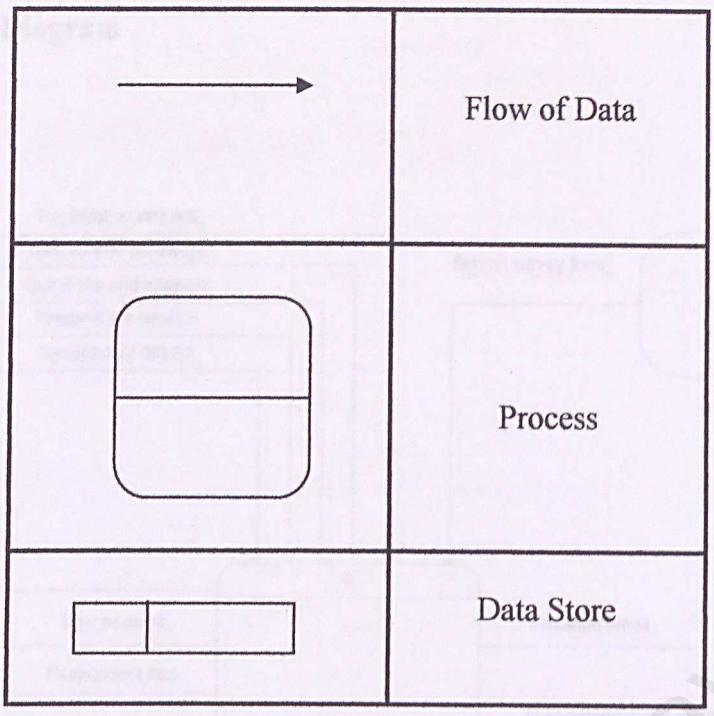
ii. Analysis of a proposed system to determine if the necessary data and processes have been defined.

iii. Help to identify the required data or process of purposed system making sure that they have been defined.

DFD is easy to be understood as it has symbols that specify the physical aspects of implementation. There four basic symbols in DFD: entity, flow of data, process and data stores (see Table 5.1).

Table 5.1: DFD Symbols

| Symbols | Attribute |
|---|---|
|  | Entity |




C.Gane and T.Sarson base the convention, which is used to design DFD on the work. The data flow is conceptualized with a top-down perspective. So, the Context Level Diagram will be drawn, followed by the Diagram 0. Diagram 0 is an overview process of all the major modules in ELONS that includes all the data stores, entities and process involved.

### 5.3.2.2 Context Diagram

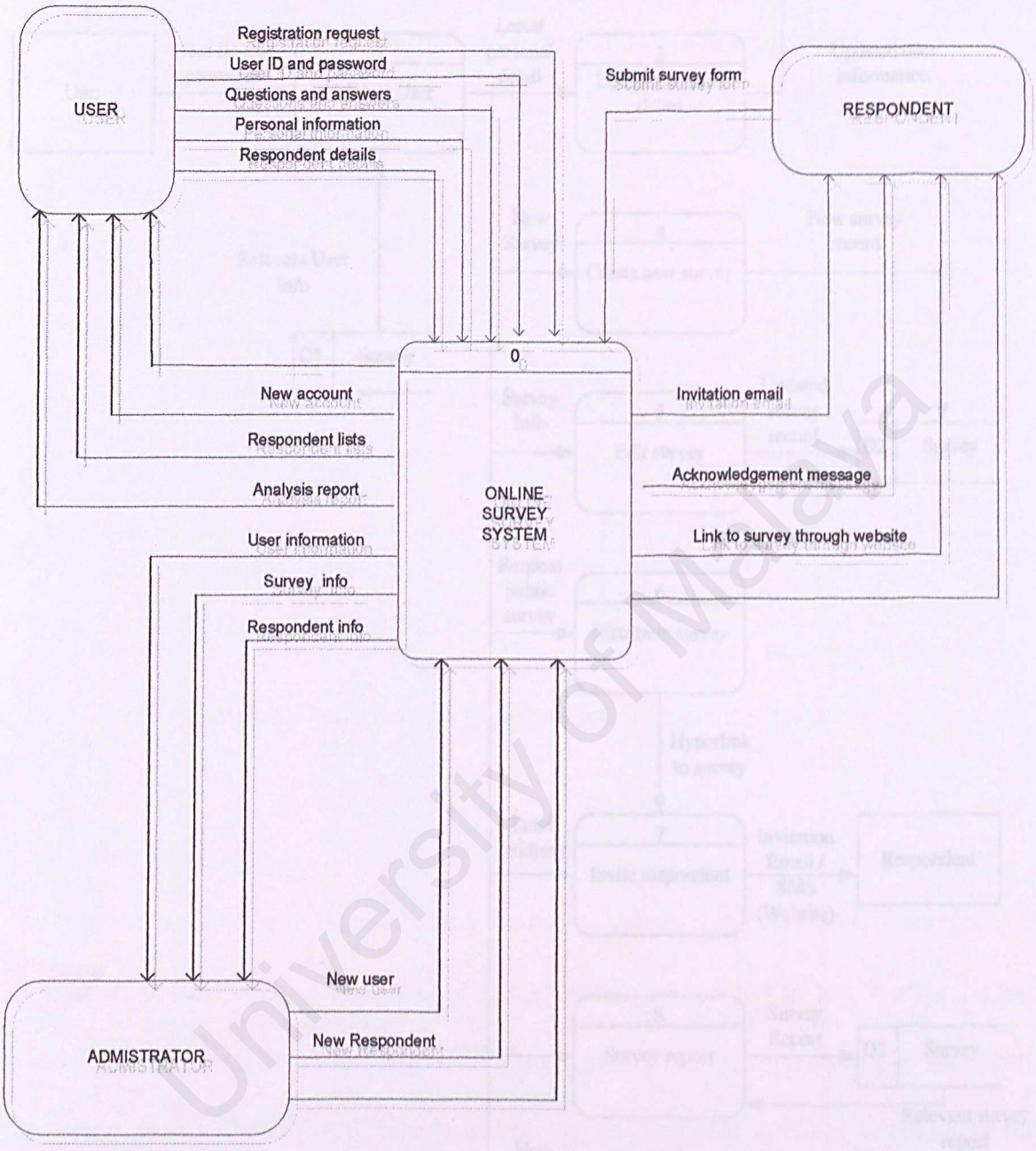



Figure 5.3: Online Survey System Context Diagram

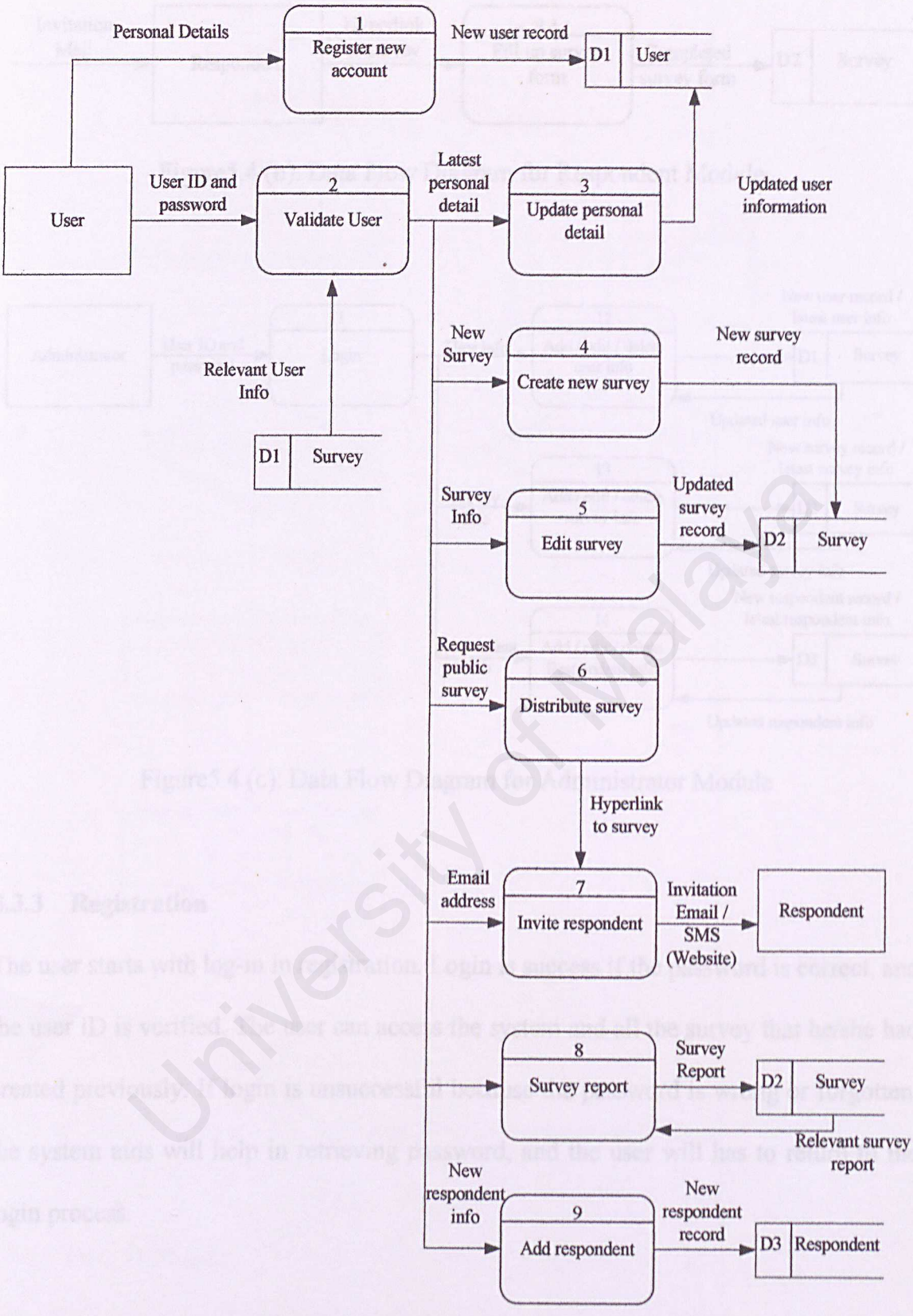



Figure 5.4 (a): Data Flow Diagram for User Module

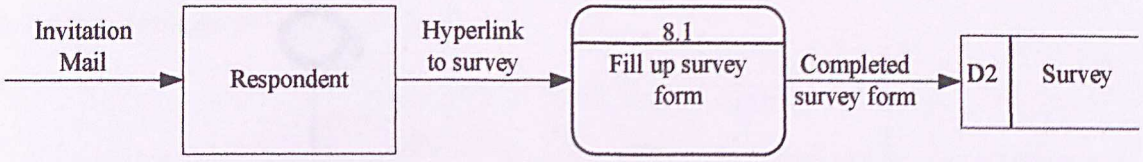



Figure5.4 (b): Data Flow Diagram for Respondent Module

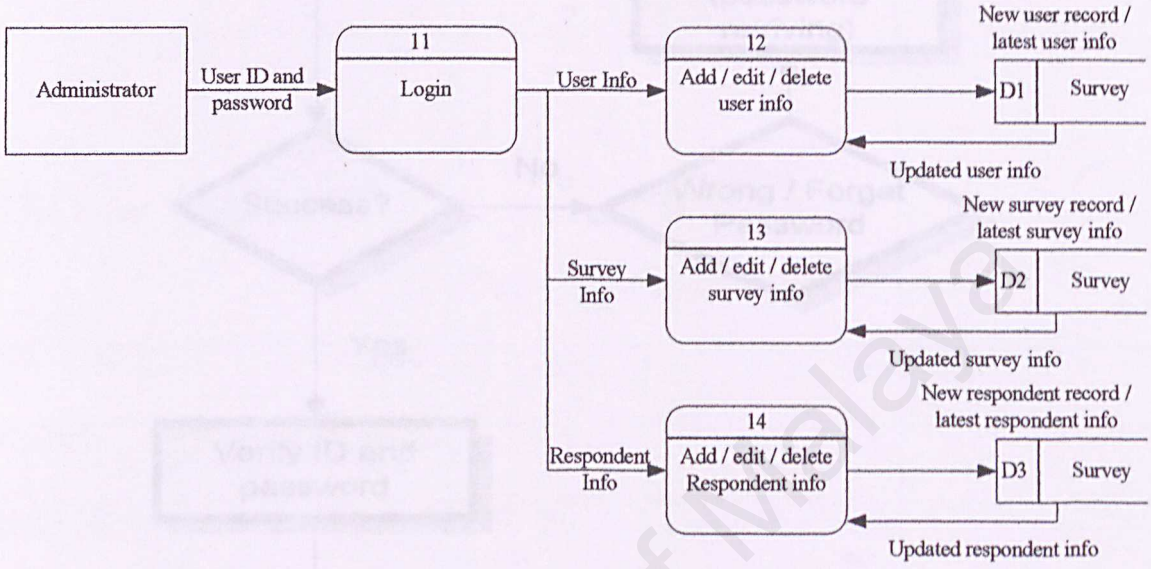



Figure5.4 (c): Data Flow Diagram for Administrator Module

### 5.3.3 Registration

The user starts with log-in in registration. Login is success if the password is correct, and the user ID is verified. The user can access the system and all the survey that he/she had created previously. If login is unsuccessful because the password is wrong or forgotten, the system aids will help in retrieving password, and the user will has to return to the login process.

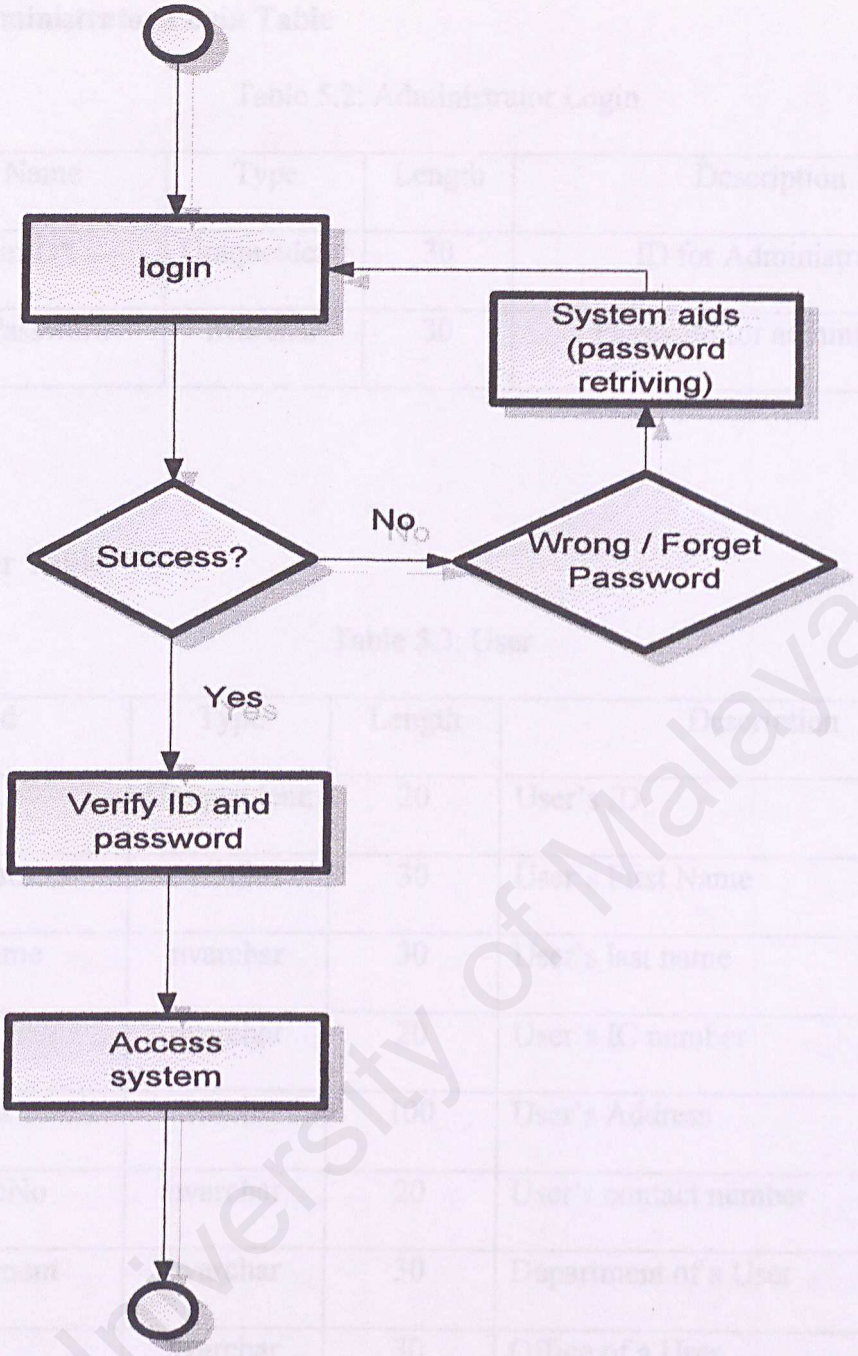



Figure 5.5: Structure Flow of Registration Process

### 5.3.4 Data Dictionary

Data dictionary or metadata can be defined as descriptions of the database structure and contents. Data dictionary defines the field, field type and descriptions of each table.

### 5.3.4.1 Administrator Login Table

Table 5.2: Administrator Login

| Field Name | Type | Length | Description |
|---|---|---|---|
| AdminID* | Uniqueident: | 30 | ID for Administrator |
| AdminPassword | nvarchar | 30 | Password for administrator |

### 5.3.4.2 User Table

Table 5.3: User

| Field | Type | Length | Description |
|---|---|---|---|
| UserID* | Uniqueident: | 20 | User's ID |
| UserFirstName | nvarchar | 30 | User's First Name |
| UserLastName | nvarchar | 30 | User's last name |
| UserIcNo | nvarchar | 20 | User's IC number |
| UserAddress | nvarchar | 100 | User's Address |
| UserContactNo | nvarchar | 20 | User's contact number |
| UserDepartment | nvarchar | 30 | Department of a User |
| UserOffice | nvarchar | 30 | Office of a User |
| UserUsername | nvarchar | 20 | Username of a User |
| UserPassword | nvarchar | 20 | Password of a User |

#### 5.3.4.3 User Login Table

Table 5.4: User Login

| Field Name | Type | Length | Description |
|---|---|---|---|
| UserID* | Uniqueident: | 30 | ID for User only |
| UserPassword | nvarchar | 30 | Password for User |

#### 5.3.4.4 Respondent Table

Table 5.5: Respondent

| Field | Type | Length | Description |
|---|---|---|---|
| RespondentID* | Uniqueident: | 20 | Respondent's ID |
| RespondentFirstName | nvarchar | 30 | Respondent's First Name |
| RespondentLastName | nvarchar | 30 | User's last name |
| RespondentIcNo | nvarchar | 20 | Respondent's IC number |
| RespondentAddress | nvarchar | 100 | Respondent's Address |
| RespondentContactNo | nvarchar | 20 | Respondent's contact number |
| RespondentDepartment | nvarchar | 30 | Department of a Respondent |
| RespondentOffice | nvarchar | 30 | Office of a Respondent |
| RespondentUsername | nvarchar | 20 | Username of a Respondent |
| RespondentPassword | nvarchar | 20 | Password of a Respondent |

## 5.4 Database Design

Data storage is a critical component of the most information system. The goals of database design are as follow:

i. A database should be reliable – the stored data should have high integrity to promote user trust in that data.

ii. A database should provide for the efficient storage, update and retrieval of data.

iii. A database should be adaptable and scalable to new and unforeseen requirements and application.

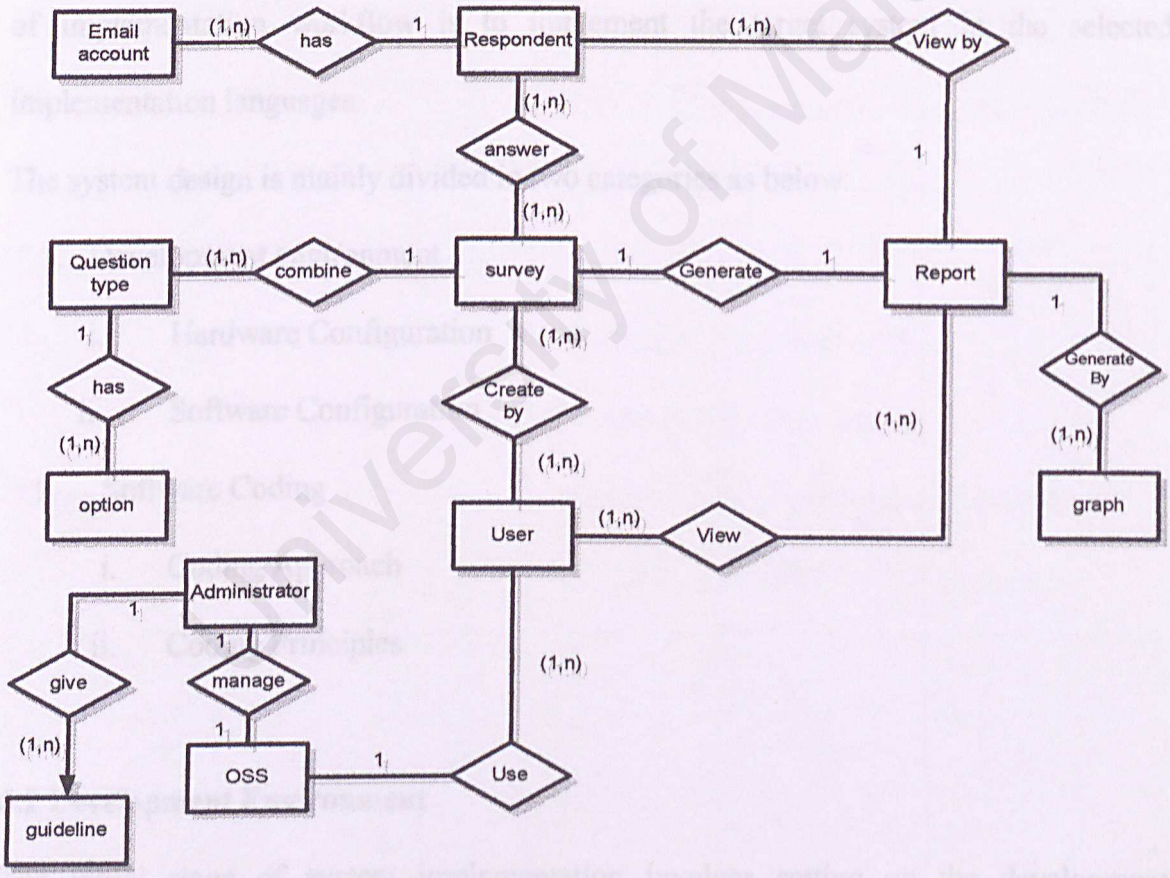



Figure 5.6: OSS Database Design

# CHAPTER 6: SYSTEM IMPLEMENTATION

## 6.1 Introduction

Implementation is the process of translating the detailed design into code. System implementation is the construction representation of the application and the delivery of the application into the 'production phase'. This stage involves both application and database implementation.

The purpose of the system implementation is to develop a functional system that fulfils business and design requirements. It includes building and testing its contained modules and sub-modules, involving system requirements and design in programs codes. The aim of implementation workflow is to implement the target system in the selected implementation languages.

The system design is mainly divided in two categories as below:

1. Development environment
    i. Hardware Configuration
    ii. Software Configuration
2. Software Coding
    i. Coding Approach
    ii. Coding Principles

## 6.2 Development Environment

The initial stage of system implementation involves setting up the development environment. Development environment has certain impacts on the development process of a good software system. Development environment consists of hardware and software

configurations. The appropriateness of the hardware and software chosen is very important because it will not only help to expedite the system developments but determine the success of the project. The hardware and software tools used to develop the entire system are discussed below:

### 6.2.1 Hardware Configuration

Table 6.1 Hardware Configuration

| Hardware | Requirements |
|---|---|
| Processor | Intel Pentium 4 processor 1.80 GHz |
| Motherboard | PC Partner I845 chipset Main board |
| RAM | 256MB Kingston SDRAM PC133MHZ |
| Hard disk | HDD 40.0GB Maxtor/Seagate 7200rpm HDD |
| Graphic Card | 32MB NVIDIA TNT2 AGP |
| Other standard computer peripherals | 52x 24x 52x CDRW<br>10/100MBPS Ethernet card<br>1.44MB Floppy Disk Drive<br>Windows Compatible Keyboard and Mouse<br>15"Samsung Monitor |

### 6.2.2 Software Configuration

Table 6.2 Software Configuration

| Software | Purpose | Description |
|---|---|---|
| Microsoft Windows XP Professional | System Requirement | Operating System [Final Stage] |
| Microsoft Internet Information Service 6.0 (IIS 6.0) | System Requirement | Web Server host [Final Stage] |
| Microsoft Visual Interdev 6.0 | System Development | Coding the web pages |
| Microsoft Internet Explorer 6.0 (IE 6.0) | System Development | Web Browser |
| Microsoft Access 2003 | System Development | Database Design & Database Server |
| Adobe Photoshop | Interface Design | Image design and creation |
| Microsoft Project 2003 | System Design | Diagram Creation [Earlier and final stage] |
| Microsoft Visio 2003 | System Design | Diagram Creation [Earlier stage] |

## 6.3 System Coding

System implementation phase involves programming or coding procedures, which converts the system requirements and design into program codes. That means programs

that implement the design must be written. The most important thing in coding standard is the naming standard called comment written in '' green color. During the coding, the author has coded the system in a way that is understandable not only when revisit for testing, but also easier for future enhancement. Good coding approach provides easy identification and clear guide for programmers during the maintenance phase of the system.

### 6.3.1 Coding Approach

There are properly two types of coding approach, namely top-down and bottom-up. The bottom-up coding is based on coding the lower-level modules initially and leaving the high-level modules merely as skeletons that are used to call the lower modules, whereas the top-down approach is the reverse of the bottom-up approach.

The Online Survey System was developed modularly using the bottom-up approach. Each lower-level function and procedure was developed individually which are then integrated into appropriate high-level modules accordingly. Bottom-up approach offers some advantages such as:

i. Critical functions can be coded initially to test their efficiency.
ii. Increase the development process as the lower-level modules or functions can be built independently and simultaneously without waiting or delaying the others.
iii. Testing can be conduct on some of the modules while the others are still under construction.
iv. Faults are easier to be detected.

### 6.3.2 Coding Style

Coding style is an important attribute of source code where it determines the intelligibly, readability and maintainability of program. An easy to read source code makes the system easier to be maintained and enhanced. The elements of coding style include internal documentation (source code level), methods for data declaration and approach to statement construction. Some of good coding practices that had been applied are as followed:

i. Indent coding – by formatting and indenting the codes, it helps to find and detected a place where an error occurred. In addition, the indent codes will be easier to read and it is useful in coding which involves a lot of conditional structure and loop structure

ii. Layout program source code to improve its readability – each sentence is begun on a new line; statement following control structure is indented; white space is used to set off related blocks of code

iii. Use of consistent and meaningful variables name – help a program to be "self-documenting" without excessive use of comments

iv. Comment code – write description or comments in the source codes

Active Server Page (ASP) is a primarily a scripting environment; while languages used to develop an ASP are HTML, VBScript and JavaScript. The challenge of coding in ASP is of determining and separating the HTML source code from the scripting counterpart. Each of them is not hard to distinguish. Each ASP section contained within <% and %> delimiters and statements falls in this block are called ASP script. VBScript is used as the scripting language as the ASP statements.

For client-side scripting, it must be delimited by the <SCRIPT>…..</SCRIPT> tags. On the other hand, server-side scripting requires the RUNAT attribute set to Server so that the script should be executed on the server rather than the client (browser). An example is as below:

```
<SCRIPT LANGUAGE = "VBSCRIPT" RUNAT = "Server">
.....
</SCRIPT>
```

Another useful technique being used is inserting pre-built blocks with "#include" statement in an ASP page. For example, both top banner and left side navigation menu are managed in separate files. Then, pages that required displaying a top banner, for instance, used this include statement to achieve its display function. This approach is able to minimize duplication and simplify the possible maintenance work in the future. If the maintainer wish to modify the top banner, he or she only require making modification on one file, and without modify all the relevant files.

Below shows some examples of HTML coding, VBScript coding, and also JavaScript coding written in this system:

#### 6.3.2.1 ASP Script Examples

The easiest way to add a script to an Active Server page is by using the script delimiters <% and %>. Any text enclosed within these delimiters will be processed as a script.

```
<%
dim top_path
top_path="../"
ec=request.QueryString("ec")
if not isnumeric(ec) then
ec=0
end if
select case ec
case 0
case 1
m="User Name and password can't be empty"
case 2
m="Password is wrong"
case 3
m="Timeout of login"
case 4
m="User is be forbidden"
end select
%>
```

### 6.3.2.2 HTML Coding Examples

Below is an example taken from the project file name "about.asp".

*Note: <! -- and --> character is used to create a comment.*

```
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=gb2312">
<title>About</title>
<link href="css/c1.css" rel="stylesheet" type="text/css">
</head>
<body>
<!--#include file="top.asp" -->
<table width="100%"  border="0" cellspacing="0" cellpadding="0">
 <tr>
</table>
</body>
</html>
```

### 6.3.2.3 VBScript Coding Examples

Below is an example taken from the project file name "userlogin.asp".

*Note: ‘ character is used to create a comment*

```
<%
dim
a(255,3),s_id,rs,sql,n,pathlevel,c_uid,c_sid,c_iprepeat,c_surveyname,c_dbname,c_h,c_vi
ewdata,c_submitpage,c_tablename,c_framestyle,c_memo,c_enstat,c_IPsubmit,c_enuse,c
_EndDate,c_enlink,c_yj,c_theend,c_htmlfilename,c_surveypsw
pathlevel="../"%>
<!--#include file="conn.asp" -->
<!--#include file="function.asp" -->
<%
set rs=server.CreateObject("adodb.recordset")
sql="select itemtype,itemname,rowname,eninput,inputrowname from itemtable where
s_id="&s_id&""
rs.open sql,cn,1,3
```

### 6.3.2.4 JavaScript Coding Examples

Below is an example taken from the project file name "userlogin.asp".

*Note: // character is used to create a comment*

```
<script language="javascript">
function checkform()
{
if (myform.username.value=="")
{
window.message.innerHTML="Please enter user name"
myform.username.focus()
return false
}
if (myform.password.value=="")
{
window.message.innerHTML="Please enter password"
myform.password.focus()
return false
}
return true
}
</script>
```

#### 6.3.2.5 Include File

```
<!--#include file="bottom.htm" -->
```

The above command is used to display the bottom banner, which scripts indeed are written in "reportforms.asp" file.

### 6.3.3 Integration

Integration is also an important step to do during the implementation of OQSS. Since the system consists of several modules and sub system, integration was the last stage in the system to integrate all of them into a whole. In this step, some of the actions have been taken on the design of each module such as:

i. Match font size and font color;

ii. Background color;

iii. Add in related hyperlink.

After completing integration, the developer also has to check whether the integration can be used and applied in those pages less the system will not be operating well.

## 6.4 Coding Principles

Several principles were applied during the development of this system to ensure good quality and the proper structure in the code generation.

**i. Reusability**

Reuse has been the most focusing principle during the coding phase for this system. Reuse can improve product quality throughout the software development process. Here, 'reuse' refers to creating components designed to be reused in subsequent applications. In this system, the author has coded several useful coding blocks, which to be reused in other program code such as header and footer code of every web page file and error checking methods.

**ii. Readability**

Readability is also important during the system-coding phase. Codes are formatted to enhance understanding because it is very important when it comes to the enhancement of the system in the future by other people. Several strategies are used in preserving readability in the codes, including meaning variables and labels names, comment and proper identification.

**iii. Robustness**

Robustness refers to the quality that causes a system to be able to handle unexpected error and echo back with proper responses. Error handling should be done to increase the robustness of the system. The system has the ability to validate systems input to ensure correct data is provided in order to protect system integrity. Besides that, database will also be back-up automatically for restore purpose when there is some unplanned system interruption occurs. Appropriate errors message were displayed response to user's input.

# CHAPTER 7: SYSTEM TESTING

## 7.1 Introduction

System testing is an integral component of the software process and an activity that must be carried out throughout the life cycle. It is an interactive process to evaluate the effectiveness of a program in executing its function and is a very important step has to be well conducted before the system is delivered to the end user. System testing is also involved the process of validation and confirmation of the system to ensure that the quality of the system has meet the specific requirement.

This phase is also often referred to as Verification and Validation (V & V). Verification refers to the set of activities that ensure the software correctly implements a specific function. Validation refers to a different set of activities that ensure the software has been built is traceable to user requirements. A successful test is one in which no errors are found.

Through out the testing process, the specification, design, and program will be reevaluated to ensure that it is error free and work according to specification. Generally, the purposes of system testing are as follow:

i. To detect and verify errors and bugs that exists during the implementation phase
ii. To reveal different classes of errors and do so with a minimum amount of time and effort
iii. To demonstrate that software functions appear to be working according to specification
iv. To demonstrate that behavioral and performance requirements appear to have been meet

v. To correct all the errors and bugs

Therefore, a well perform system testing is capable of detecting errors that cannot be traced during analysis, design and implementation phases.

**7.2 Type of Faults**

During the process of system testing, there will be several types of errors and bugs that can be detected. Therefore, it is important to know the kind of faults to seek. Faults can be categorized as below:

i. Algorithmic fault

Occur when a program algorithm or logic does not produce the proper output for a given input because something is wrong with the processing steps. This usually happened because of mistake made during the program design process and it can be detected easily when going through the steps of the program code.

ii. Syntax fault

Syntax fault can be checked while parsing for algorithmic faults. This will ensure that the construct of programming language is need properly.

iii. Documentation fault

Occurs if the documentation does not match what the application does, and such faults can lead to other faults later because of the wrong implementation. Usually, documentation is derived from the system design and provides a clear description of

what the programmer would like the program to do, but the implementation of these functions is faulty. Such faults can lead to other faults later.

### 7.3 Testing Strategy

Testing is a process of exercising or evaluating a system by manual or automatic means to verify that it has satisfied requirements or to identify differences expected and actual results. A well-defined system testing strategy can assist in controlling a system testing process that is complete and detailed, besides being able to improve the effectiveness of the testing process to the developing system.

This project was tested with the following generic characteristic:

i. Testing begins at the module level and works "outward" toward the integration of the entire system.
ii. Different testing techniques are appropriate at different points in time
iii. Testing and debugging are different activities, but debugging must be accommodated in any testing strategy

Testing can uncover different classes of errors in a minimum amount of time and with a minimum amount of effort. There are four types of testing strategies:

i. Unit Testing
ii. Module Testing
iii. Integration Testing
iv. System Testing

### 7.3.1 Unit Testing

Unit testing is the first approach in system testing. In unit testing, each unit should be tested individually and in isolation by exercising its inputs and observing its outputs or behavior. It may also be possible for the unit to be tested using the facilities available in the development environment (such as stepping through the statements of code using a debugger). This process verifies that the component functions properly with the types of input expected from studying the component's design. Unit testing may also be termed component testing. Typically, the software engineer or programmer who coded the unit will design and run a series of tests to verify that the unit meets its requirements.

Following steps are used in carry out the unit testing for Online Survey System:

i. Control objects are tested to ensure its functionality.

ii. Test cases are developed to ensure that the input is properly converted into the desired output.

iii. The code of the program is examined by reading through it to spot for possible algorithm, data and syntax faults.

iv. Different data types are used to test the error handling function.

### 7.3.2 Module Testing

Module testing is a collection of dependent components that encapsulates related components only. Therefore, it enables each module to be tested independently. This testing will ensure that the module calling sequence in this project is systematic. The main purpose of the test is to verify the correctness of the flows of events. Therefore, with the system development process being carried out module by module, the module testing will also be carried out once a module has been completed.

### 7.3.3 Integration Testing

Integration testing is the process of verifying that the system components will work together as describe in the system and program design specification. In this phase, the test is conducted on the interface of two interactive components in a single unit. This involves the examination process of two interface components in the system and it continue until the entire system is developed.

In general, integration testing is carrying out to ensure the interface between modules can function properly. The most common problem that arises in large software system is subsystem interface mismatches. The subsystem test procedures should concentrate on the detection of interface error by vigorously exercising those interfaces.

### 7.3.4 System Testing

Final testing procedure done is system testing. However, testing the system at whole is very different from previous unit testing and integration testing. System testing is a series of different tests designed to fully exercise the software system to uncover its limitations and measure its capabilities. The objective is to test an integrated system and verify that it meets specified requirements. Although each test in this project has a different, all work to verify that system elements have been properly integrated and perform allocated functions.

There are several types of system testing that are worthwhile for a software system. For this project, three types of system testing are used:

i. Function Testing

System testing begins with function testing, which is based on the system's function requirements. Function testing is performed in a carefully controlled situation. Function testing is based on the system functional requirements. In other words, a function test is used to check that whether the integrated system performs its functions as specified in the requirements. Each module involved is tested individually to determine whether the system performs as required.

ii. Performance Testing

Performance testing addresses the non functional requirement of the system after function testing is completed. System performance is measured using performance objective set by potential users as highlighted in the non functional requirement section as guideline. The purpose of this testing is to test the run-time performance of software within the context of an integrated system. It requires both hardware and software instrumentation.

iii. Security Testing

These system tests will attempts to verify that protection mechanism built into the system will protect it from improper penetration.

# CHAPTER 8: SYSTEM EVALUATION

## 8.1 Introduction

System evaluation is the final phase of developing a system and an important phase before delivery the system to the end users. System evaluation was related to user environment, attitudes, information priorities and several other concerns that are to be considered carefully before effectiveness can be concluded.

At this point, the Online Survey System is considered successfully achieved and implemented. The system is now ready for the evaluation and assessment concern. Several issues and reviews on the final system are explained in this section.

## 8.2 Problems and Solutions

The following are the major problems encountered during the beginning of the project through out the end of the system development process.

i. **Difficulty in Choosing Suitable Development Technology, Programming Language and Tools**

There are many software tools available to develop Online Survey System. Choosing a suitable technology and tools was a critical process as all tools possesses their own strengths and weaknesses. In addition, the availability of the required tools for development was also a major consideration.

**Solution:**

Seeking advises and views from project supervisor, course-mates and even seniors engaging in similar project were carried out. Furthermore, a lot of research and studies were done before any decision was made.

ii. **Lack of Knowledge in ASP, VBScript and JavaScript**

Since there was no prior knowledge of programming in ASP, VBScript and JavaScript, there was an uncertainty on how to organize the codes in a web page. These programming languages and concepts were never taught before and to implement such as application requires a fair grasp of the languages.

**Solution:**

Although it really cause a lot of time to learn the new technology, but choosing to program in ASP, VBScript and JavaScript proved to be a wise move. Most of the problems faced were manageable through browsing the Internet for related materials such as online ASP, VB and JavaScript tutorial, MSDN help files, and etc. Besides, the reference books for ASP, Visual Basic and JavaScript that available in the market also helped a lot. Discussion with friends especially seniors using the same technology was a great help. A more efficient method was through trail and error during the coding phase.

iii. **Lack of Hardware and Software Configuration Knowledge**

The environment between software and hardware need to be configured before the start of the development phase. For example, the security of IIS web server need to be configures and the virtual directly need to be set to point to the system.

Moreover, the database connection needs to be configured to connect the system to the database.

**Solution:**

Browse through the developer community in search for similar problems and solution posted in the community. Besides that, help files and reference from the Internet also being used to solve the problem.

## 8.3 System Strengths

Below are the strengths of Online Survey System:

i. **Simple and User Friendly Interfaces**

The system interfaces uses a series of light and soft color as its main color. These colors would not burden the users' eyes even they view the web page for a long time. The Graphical User Interfaces (GUI) designs for this system are similar with other common Online Survey System. So, the users will familiar with this system in a very short period. The Web pages are designed to suit a wide spectrum of user. Forms and other command buttons are readable, simple and easy to use. The novice users will feel comfortable with this system because this system does not using the jargons in its GUI.

ii. **Provide an Easy to Use Tool**

The commands and the layout of this project are simple and well organized, therefore it is easy to use, simple to learn and understandable. Normal users with some computer knowledge will find the Web page is easy to handle.

iii. **Web Enabled**

The system was based on the web technology. It was using the client server approach that allowed processing load to be shared between the client and the server, thus reducing the burden on the server and allow it to provide better service.

iv. **Effective User Login and User Identification System**

Users are protected by authentication feature. Login and password are required before allowing the users access to the protected site. All types of users using a same login page to login their account. The system is able to identify different type of user and the level of access to the system. The system will only allow the user to access to respective links only.

v. **Implements error handling**

To avoid run time error, this system is developed with error handling function. Error message will be displayed when exceptions encounters.

vi. **Provide database maintenance**

Users are able to do housekeeping for database maintenance. For example, they can create, add, modify, update, and delete customer records in the database.

vii. **Significant validation on input data**

Check for the validation of every data input in the field and prompt the user of invalid data being input and ask for valid data. Data field that disallow data to duplicates will also prompt the user about the error.

viii. **Reliability**

Inputs of the user to the system are validated and verified to prevent errors caused by the invalid input. If there is an invalid input, error messages that specify the error will be prompted to inform the user about the error. Besides that, database that contains all the essential and important information will be back-up automatically at a specific interval.

ix. **Consistency**

The system design is consistent throughout the whole system. The main menus are remained at the same position although the user switched from one module to another. Thus, users can easily search for a particular option that they require in the system.

x. **Fast Response Time for Information Retrieval**

The Web pages are designed in such a manner that they are loaded in a reasonable amount of time to ensure users need not wait for a long time to view the pages. Heavy graphics are avoided and ActiveX controls are kept to the minimum wherever possible.

## 8.4 System Constraints & Limitations

Although the best design and great implementation efforts has been used to develop Online Survey System, but it still has several weakness, which will affect the system. These weaknesses are mainly caused by time constraint. The following are the weaknesses of the system:

i. **Browser limitation**

This system can only run in Internet Explorer 4.0 and above. This is due to the deployment of VBScript language, which is the default supporting language for ASP. User uses browsers that do not support these features will not be able to use the functions available in this system.

ii. **Language limitation**

This system only supports single communication language, which is English.

iii. **Email**

For these email that must be dispatched without delay, Email feature is able to send the survey form immediately to the respondent. However, Online Survey System does not provide this facility.

iv. **No Proper Generating Report Function**

This system cannot generate a proper report regards the result. This is due to such function requires the system to be executed at the mail server with at least

four CPUs and high requirement for memory since certain surveys were created in dynamic format. However they can print the description of the report.

v. **Limited reporting analysis**

Functions in Online Survey System sub-module are limited to few report generation. Besides, no graphical illustrations such as chart, bar chart and so on.

## 8.5 Future Enhancements

Future enhancement can be done to make the system more advances in order to improve the quality of the system. A system development knows no boundaries as new requirements and better implementation methods continue to arise and evolve. There are several enhancements that could extend after developed the system.

i. **Provide Report Generating Function**

This function should be included in futures because this function will allow user to generate report in printable format regarding the survey data, results and graphical illustrations such as chart, bar chart and so on.

ii. **Provide Other Languages Version**

As the system is aim at Malaysian Citizens, therefore besides English, providing another version of the national language – Bahasa Malaysia version would be a good idea.

iii. **Provide Email Service**

This function should be included in futures because this function will allow user to email the survey form to the respondents.

## 8.6 Knowledge and Experience Gained

From the beginning of this project until the final documentation, a number of problems have occurred and experiences are learned from there. This project gives a lot of benefit and knowledge, there are:

i. **Communication and Presentation Skills**

Communication and presentation skills are really important during the viva session. Presentation material must be interesting but yet informative to describe the whole system. Nevertheless, language fluency and body language also play a vital role during the whole presentation session. This whole experience provides me a step forward as to prepare me for the future working environment.

ii. **Development tools knowledge**

During the system coding and implementation, a lot of knowledge and techniques in ASP, HTML, VBScript, and JavaScript are gained. By practically apply them in the application; it is able to improve the understanding about the languages themselves as well as their integration.

iii. **Communication skill**

During the group discussion, a lot of communication skills are required to achieve cooperation and comprehension among group members. It provides advantage in exploring circumstance that similar to future working environment.

iv. **Self expression**

Involvement and experiences gained during system development have provided the change for self-improvement and evaluation. System design and coding give a great chance to express my own opinions and ideas.

## 8.7 Reviews on Goal

At the final stage of the project, there were certain expectations on what would be achieved. The following is the expectations that have achieved:

### 8.7.1 Expectation Achieved

In overall, the system had fulfilled the expectations stated by the project. Basically all the functions of the system was designed and implemented and have been achieved successfully. The system also is eligible for future growth and maintenance. The non-functional requirements such as reliability, usability, maintainability and efficiency also are met by the system.

### 8.7.2 Objectives Achieved

The project had successfully created a system that provides online survey method for users to ease their way on doing the survey. As a conclusion, the above statements have clearly point out that the objectives to establish the system had been achieved.

**REFERENCE**


- (URL-http://perdana.fsktm.um.edu.my/~wxes3204/SE_2_0304/sw_models_1.ppt), 30/6/2004.

- (URL-http://www.firelily.com/opinions/cycle.html), 2/7/2004.

- (URL-http://www.business.mnsu.edu/brownw1/458BP/RAD.pdf), 2/7/2004.

- (URL-http://brahma.bpa.arizona.edu/MIS111Fall2002/docs/1), 2/7/2004.

- (URL-http://en.wikipedia.org/wiki/Spiral_model), 2/7/2004.

- (URL-http://scitec.uwichill.edu.bb/cmp/online/cs22l/spiralmodel.htm), 2/7/2004.

- (URL-http://www.bmra.org.uk/documents/181.doc), 10/7/2004.

- (URL-http://www.surveysupport.com/kcenter/planning/WhySurveyOnline.pdf), 10/7/2004.

- (URL-http://www.swiftinteractive.com/white1.asp), 10/7/2004.

- (URL-http://www.swiftinteractive.com/white2.asp), 10/7/2004.

- (URL-http://www.surveysystem.com/index.html), 15/7/2004.

- (URL-http://www.webopedia.com/TERM/C/client_server_architecture.html), 10/8/2004.

- (URL-http://www.darwinmag.com/read/090103/question11.html), 10/8/2004.

- (URL-http://www.neurauter.at//Diplomarbeit/html/node33.html), 10/8/2004.

- (URL-http://www.neurauter.at//Diplomarbeit/html/node34.html), 10/8/2004.

- (URL-http://www.neurauter.at//Diplomarbeit/html/node35.html), 10/8/2004.

- (URL-http://www.corba.ch/e/3tier.html), 10/8/2004.

- (URL- http://www.createsurvey.com/), 11/8/2004.

- (URL-http://www.javaworld.com/javaworld/jw-01-ssj-tiers_p.html), 12/8/2004.

- (URL-http://www.sei.cmu.edu/str/descriptions/clientserver_body.html), 12/8/2004.

- (URL-http://www.zdnetindia.com/print.html?iElementId=33892), 12/8/2004.

- (URL-http://webpedia.internet.com/TERM/I/Internet.html), 15/8/2004.

- (URL-http://techweb.cimp.com/nc/816/816w2.html), 15/8/2004.

- (URL-http://java.sun.com/developer/onlineTraining/JSPIntro/contents.html#JSPIntro0), 15/8/2004.

- (URL-http://www.wordiq.com/definition/PHP), 15/8/2004.

- (URL-http://doc.ddart.net/mssql/sql2000/html/architec/8_ar_cs_20yt.htm), 20/8/2004.

- (URL-http://info.wlu.edu/literature_review/literature_review.html), 25/9/2004.

- (URL-http://www.zoomerang.com/), 26/8/2004.

-(URL-http://www.surveymonkey.com/home.asp?Rnd=0.725857), 4/9/2004.

- (URL-www.carolla.com/glossary.html), 26/9/2004.

-(URL- http://www.amazon.com/exec/obidos/ASIN/B0000AZJV4/102-2610395-721706), 8/3/2005.

-(URL-http://www.mediacollege.com/internet/javascript/pros-cons.html), 8/3/2005

-(URL-http://les1.man.ac.uk/course/asp/material/aspcourse.ppt), 8/3/2005

-(URL-http://www.vbip.com/books/186100222X/chapter_222x_04.asp), 8/3/2005

-(URL-http://www.windowsitpro.com/WindowsScripting/Article/ArticleID/24370/24370.html), 8/3/2005

# Appendix A

## Survey Form

## SURVEY ON USAGE OF COMPUTER, INTERNET AND ONLINE SURVEY

We, Fang Yen, How Kian and Choi Ngor, the undergraduates of FCSIT, UM, are currently conducting a survey in accordance with the above mentioned for our final year project. This will only take you a few minutes of time. Please answer the survey sincerely as it will be useful for our project. Your participation is much we appreciate.

### A) Demographic Details

Gender : □ Male □ Female

Age Group : □ below 25 □ 26 – 30 years □ 31 – 40 years □ above 40

Occupation : □ Academician
□ Researcher
□ Others: _____

1. How often do you use computer per week?
   - □ Seldom
   - □ Moderate
   - □ Frequent
2. Do you own a personal computer?
   - □ Yes
   - □ No
3. Do you access to internet?
   - □ Yes
   - □ No
4. How long of time will you spend for accessing the internet per week?
   - □ < 4 hours
   - □ 4 – 7 hours
   - □ 8 – 14 hours
   - □ > 14 hours
5. Normally, what is your **main purpose** for accessing the internet?
   - □ Chatting
   - □ Checking mail

- ☐ Information searching
- ☐ knowledge/skills sharing
- ☐ Entertainment
- ☐ Others: _____

**B) Survey**

You can tick (√) more than one answer in the following questions.

1. How often do you conduct a survey?
   - ☐ Seldom
   - ☐ Moderate
   - ☐ Frequent
2. How do you conduct a survey?
   - ☐ Interview
   - ☐ Questionnaire
   - ☐ Observation
   - ☐ Others: _____
3. Do you design or create the survey by your own?
   - ☐ Yes
   - ☐ No, please specify: _____
4. What is (are) the tool(s) you use specifically in preparing / designing the survey?
   - ☐ Internet survey provider's tools
   - ☐ Released software
   - ☐ Multiple references, e.g. Internet, books, magazines, etc
   - ☐ Others: _____
5. What is (are) the **statistical** tool(s) you currently use?
   - ☐ SPSS
   - ☐ S-Plus
   - ☐ Minitab
   - ☐ Excel
   - ☐ Others: _____
6. Problem(s) encountered when designing the survey questionnaire:

- ☐ The process in creating the questions that related to the objective of the study.
- ☐ Too much workloads involved when designing the questions using tools like word and others statically tools.
- ☐ The limitations of the design tools, such as SPSS, S-Plus, Minitab, that do not generate graphs.
- ☐ Time / cost consuming
- ☐ Others: _____

7. What are the problems faced when analyzing data?
   - ☐ Do not generate charts or graphs automatically after you received the answers from respondents.
   - ☐ Manually data key-in in current tools, such as SPSS.
   - ☐ The incompleteness of the survey form.
   - ☐ Others: _____
8. Have you been encountered any problem when using **online survey system**?
   - ☐ Yes (proceed to Question 9)
   - ☐ No (proceed to Question 10)
9. Problem faces during the process:
   - ☐ Data collecting
   - ☐ Result viewing
   - ☐ Not free and involve cost
   - ☐ Create an effective and useful questionnaire
   - ☐ Time involved in understanding the terms and rules
   - ☐ Not user friendly
   - ☐ Difficult to use
   - ☐ Others: _____
10. Kindly rate the following criteria in creating an online survey based on your consideration:

    1 – Very Important
    2 – Important
    3 – Not very important
    4 – Not at all

a) Survey questionnaire generating process ---------- [ ]

b) Data collecting and analyzing processes ---------- [ ]

c) Survey conducting procedure ---------- [ ]

d) The completeness of the survey ---------- [ ]

**~~~

# Appendix B

## User Manual

## TABLE OF CONTENT

## LIST OF FIGURE

## User Manual

This User Manual will provide step-by-step instruction, which will guide and facilitate the user effectively in order to use this system.

### 1. Login

i. Key in the User Name and Password in corresponding textboxes as shown in the Figure 1.

ii. Click Login button. The system will validate the username and the password. If the detail is correct, the main or index page will be shown (refer Figure 3). Else the error message will be shown.

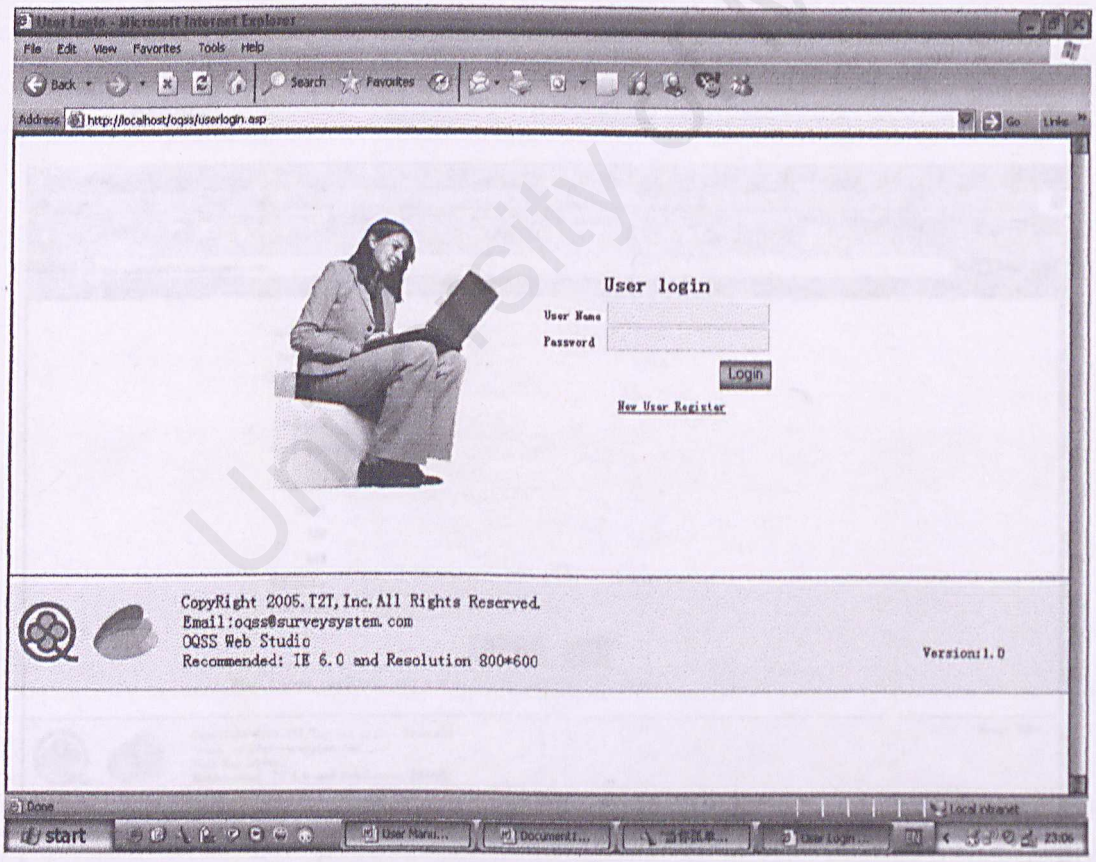



Figure 1 Login Page

## 2. New User Register

i. Click the New User Register link as shown in Figure 1. User Registration page will be shown.

ii. Key in all the corresponding information in the relevant fields. * means compulsory. Only a-z, A-Z, 0-9, ., @, /,: are allowed. Error message will be shown once one of the compulsory fields is not completed.

iii. Click Register to complete the registration. System will validate the registration to check if the user already registered. A message will be shown to state the user already in list. Or the information will be updated by the system and the Login Page (refer Figure 1) will reappear for further login.

iv. Or click back to return to the Login Page to terminate the registration process.

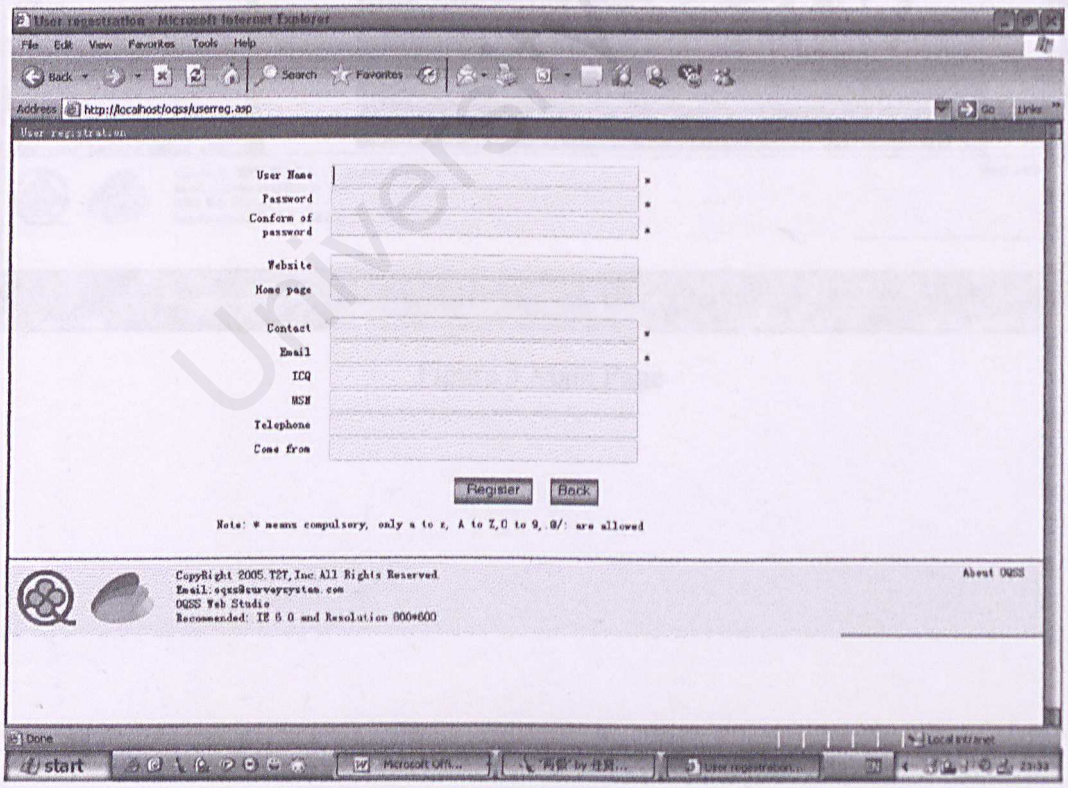



Figure 2 New User Registration Page

### 3. Main Page

The page contains hyperlinks that link to other functional pages such as Home page (itself), Create Survey, List of Survey, List of Question, Help, Modify Password and Exit. Besides, Help Section and About OQSS hyperlinks are provided as well. These hyperlinks appear on each of correlated pages.

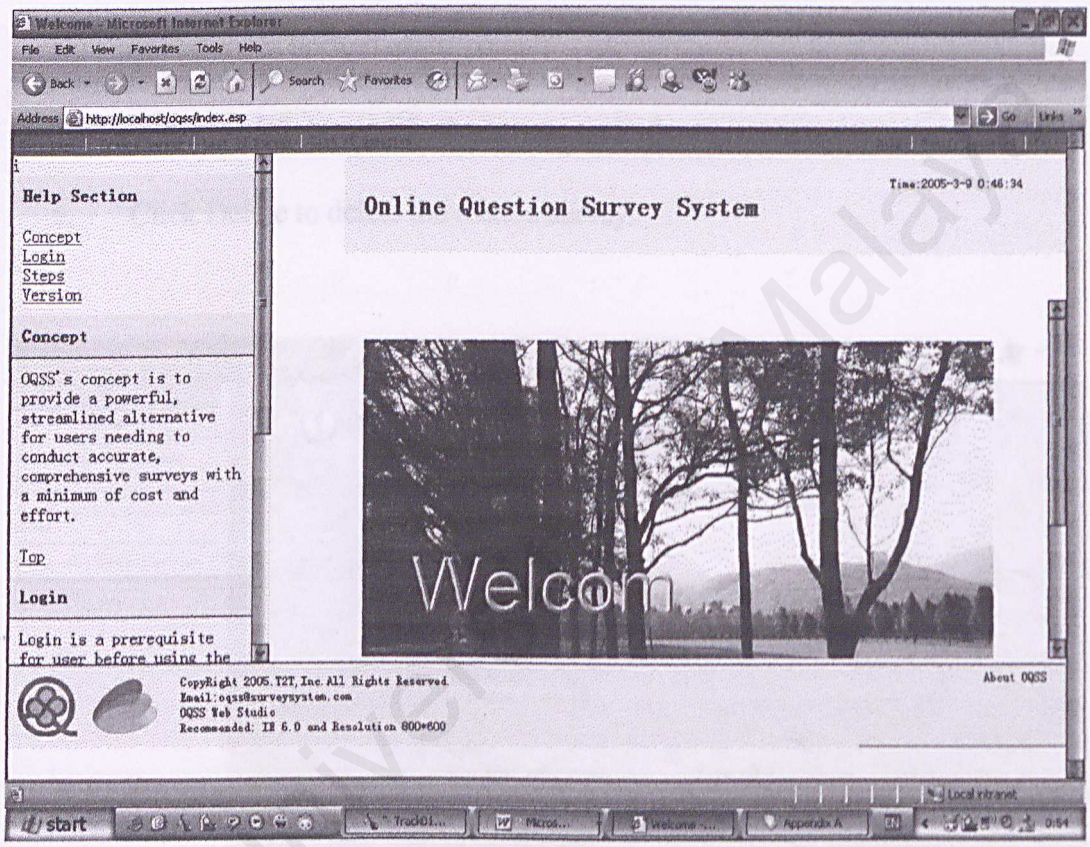



Figure 3 Main Page

## 4. Creating Survey Process

### 4.1 Step 1 - Create Survey

i. Click Create Survey to open Create Survey Page.

ii. Key in the relevant detail as well as to select the intended styles and controls.

iii. Click Create Survey button to complete the task. The created survey will appear right bottom of the page.

iv. Click Modify to modify the survey created.

v. Click Delete to delete the related survey.

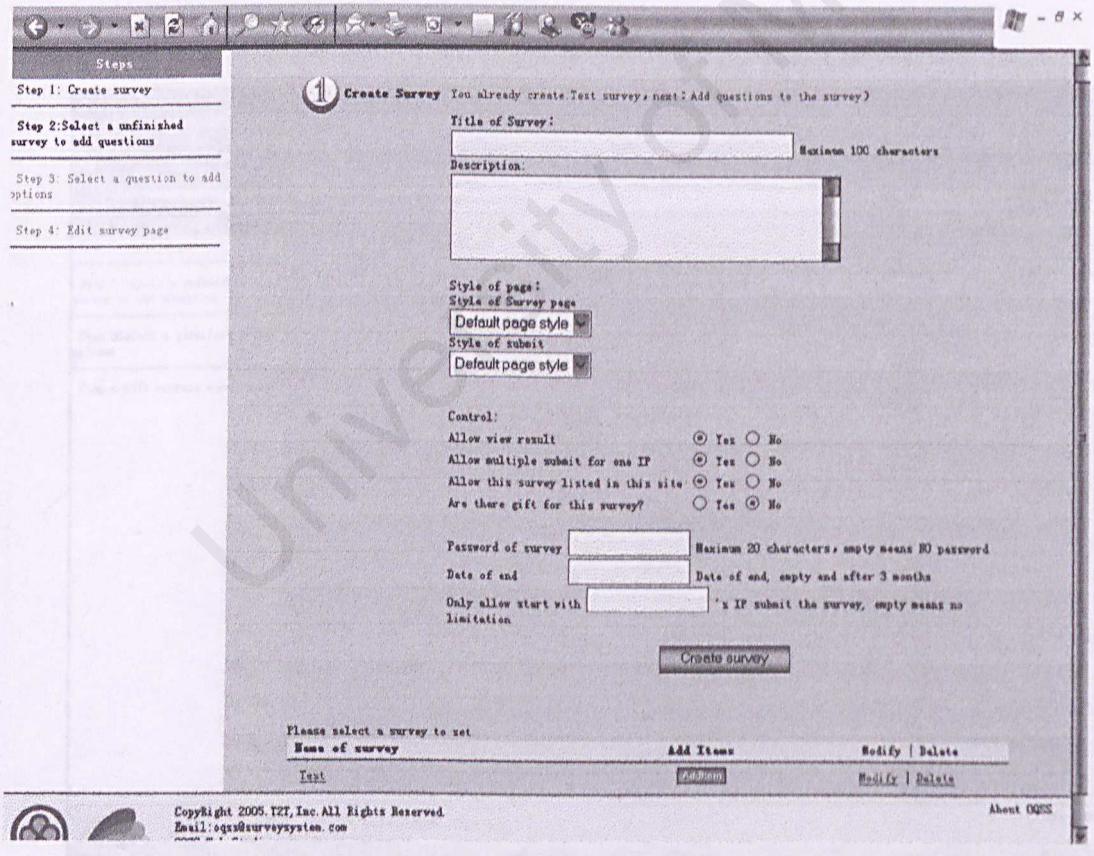



Figure 4(a) Create Survey Page

## 4.2 Step 2 - Add Questions

i. Click Add Item which accompanies the related survey created in Step 1 or click the hyperlink Step 2: Select an unfinished survey to add question on the left. The Add Questions page will appear.

ii. Key in the questions and select the question type.

iii. Select a defined question (optional). The defined question is not modifiable.

iv. Click Add Questions button. The added question will appear on the bottom of the page.

v. Click Modify to modify the question created.

vi. Click Delete to the related question.

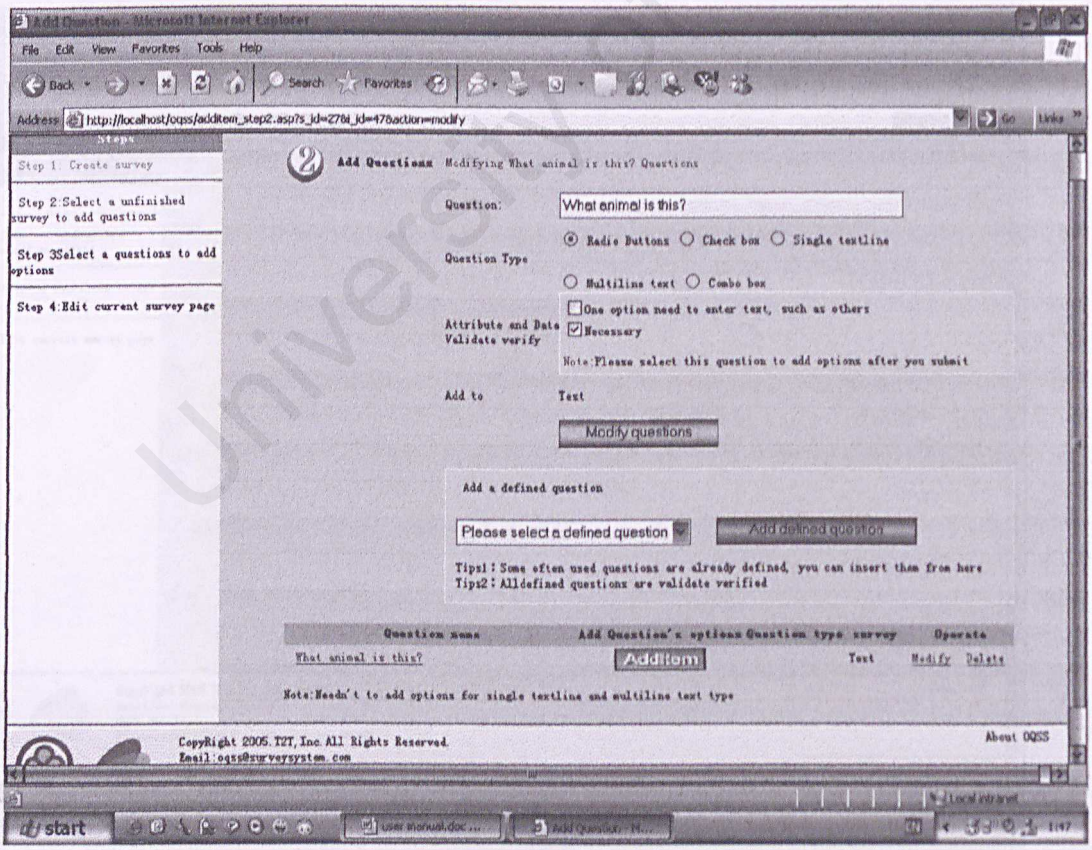



Figure 4(b) Add Questions Page

### 4.3 Step 3 – Add Question's Option

i. Click Add Item which accompanies the related survey created in Step 2 or click the hyperlink Step 3: Select question to add options the left. The Add Question's Option page will appear.

ii. Type in the option.

iii. Click Add Options. The added options will be listed as shown in Figure 4(c).

iv. Select the radio button beside the title of option means to set that option as default answer.

v. Select Modify to edit the option created.

vi. Select Delete to delete the relevant option.

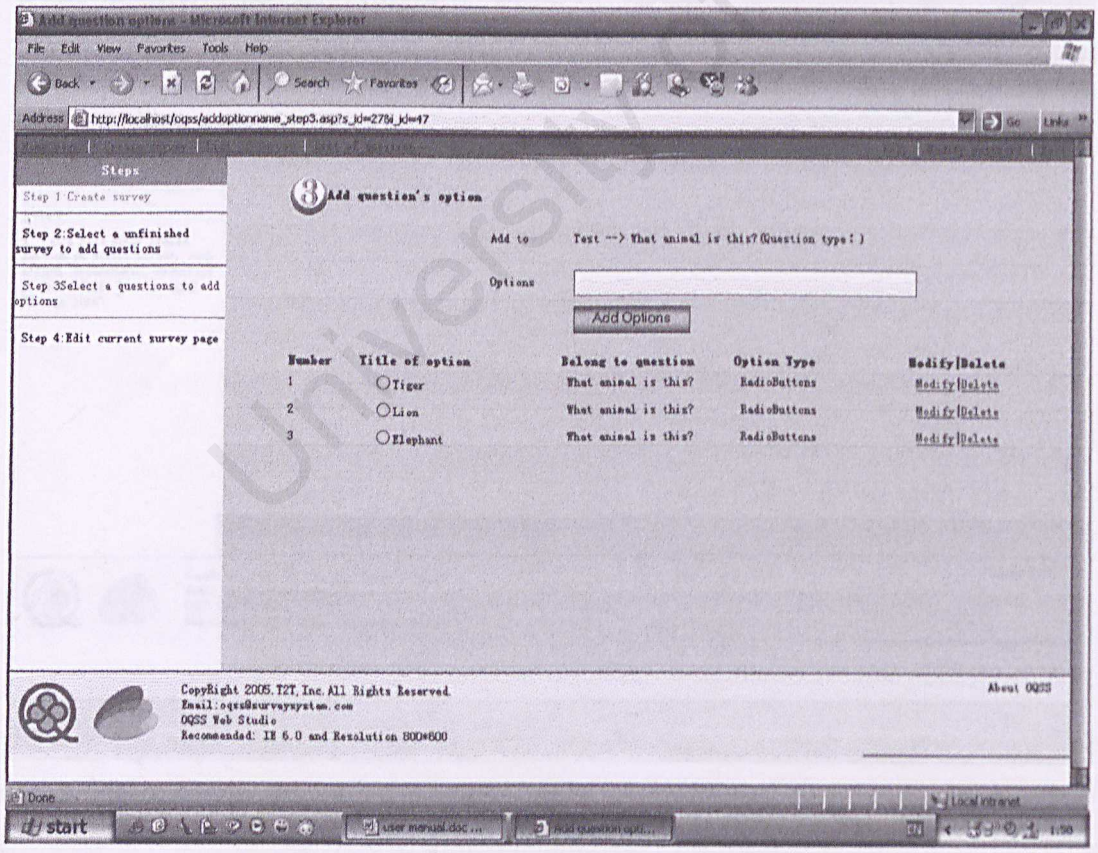



Figure 4(c) Add Question's Option Page

### 4.4 Step 4 – Edit Current Survey

i. Click the hyperlink Step 4: Edit Current Survey Page. The page contains in three different modes, namely Preview mode, Design mode and Create HTML file.

ii. Preview mode allows user to view the layout of the survey created.

iii. Design mode allows user to made further amendment or enhancement to the survey created.

iv. Create HTML's file allows user to finalize the survey created. The survey in html format cannot be modified.

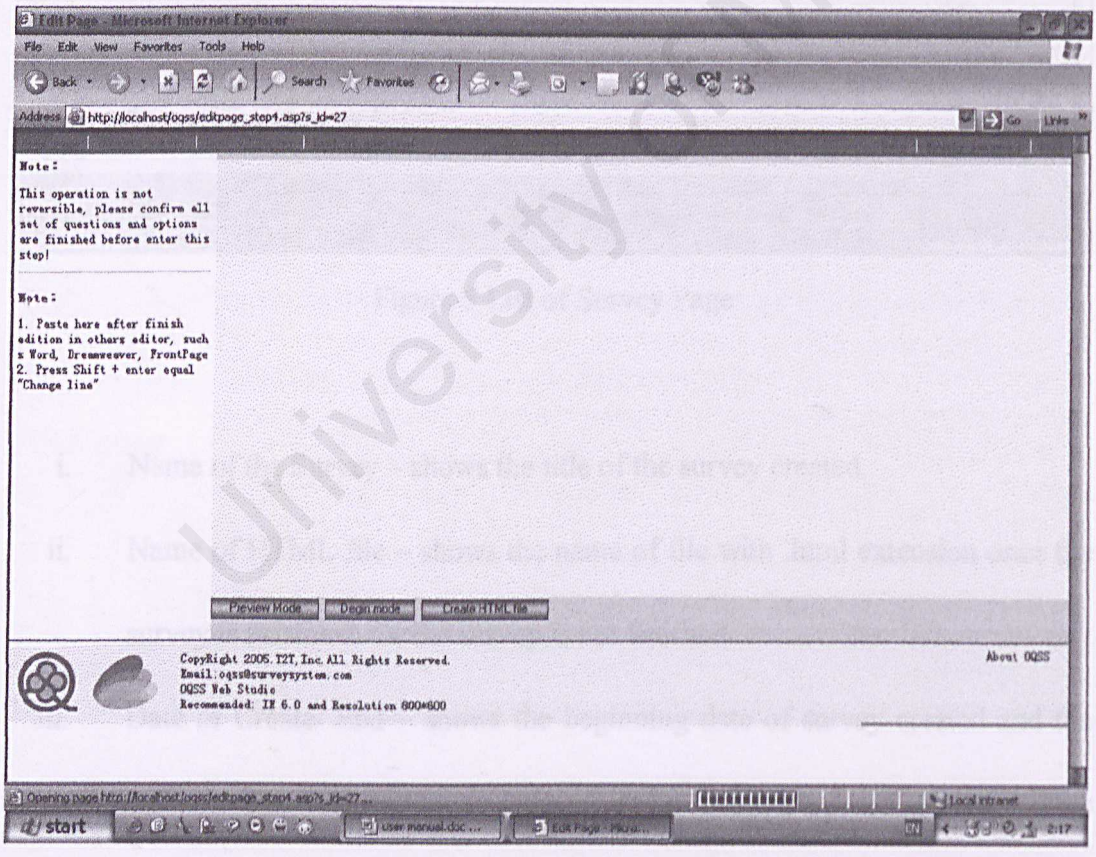



Figure 4(d) Edit Current Survey Page

## 5. List of Survey

The page depicts all the actions can be done on the survey created.

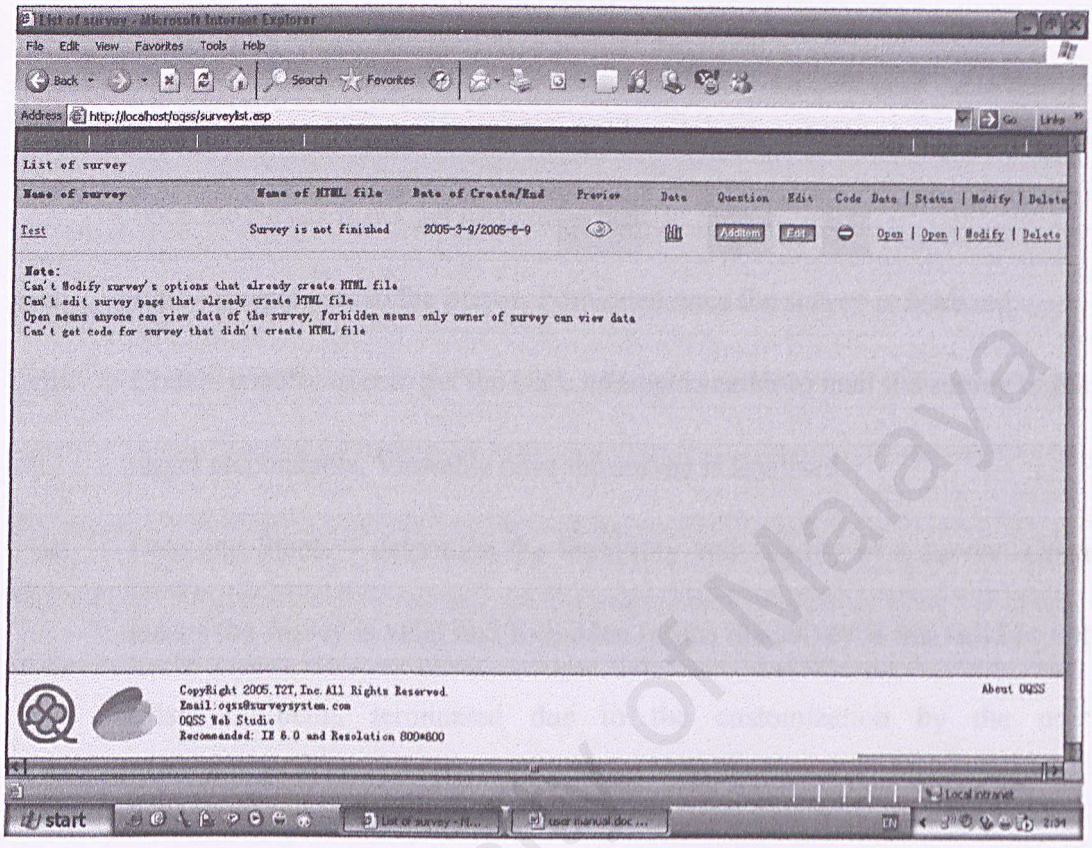



Figure 5 List of Survey Page

i. Name of the Survey – shows the title of the survey created.

ii. Name of HTML file – shows the name of file with .html extension once the survey is finalized. Or the survey is not finished.

iii. Date of Create/ End – shows the beginning date of survey created and the end date for the existence of that survey. The survey will last for three month's time if the end date is not specified.

iv. Preview – views the survey being created. This icon is viewable only once the survey is finalized in html format.

v. Data – shows the results of the answered survey in pictorial form such as bar or pie chart. Viewable once the survey is finalized.

vi. Question – enables user to modify (add or delete) questions being generated once the survey is not yet finalized – refer to Step 2.

vii. Edit – directs user to the Step 4. Forbidden once the survey is finalized.

viii. Code – enables user to get the URL address in order to mail the survey to the target respondents. Viewable once the survey is finalized.

ix. Date and Status – determine the feasibility and validity of a survey. Open means the survey is valid and forbidden means the survey is not valid or not exists or being terminated due to the customization by the user himself/herself or due to the date specified.

x. Modify – enables user to edit the survey once the survey is not yet finalized.

xi. Delete – enables user to delete the survey created.

## 6. List of Questions

The page enables user to view all the questions being created in accordance to each survey.

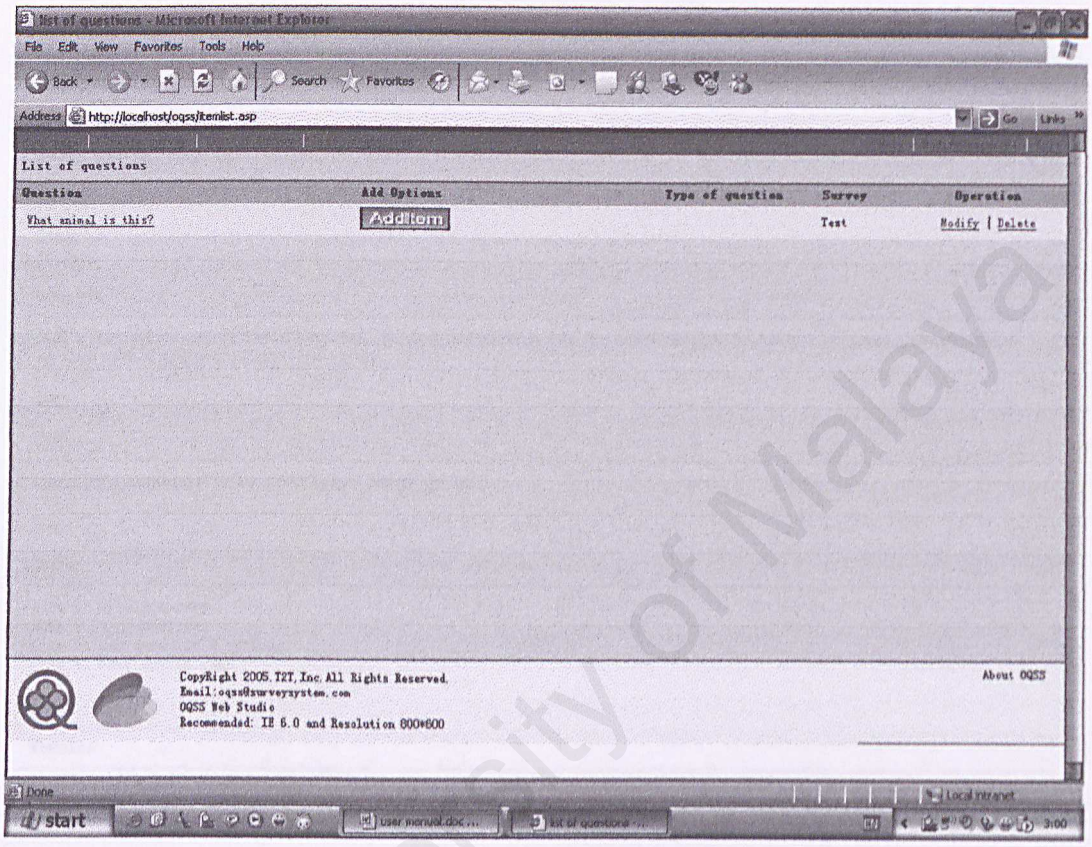



Figure 6 List of Questions Page

i. Question – list the questions being created for each survey.

ii. Add Options – enables user to add option to the question of the survey (refer to Step 3). Or it will show finished means the question of the survey is not modifiable.

iii. Survey – shows the title of the survey created in relation to its questions.

iv. Operation – enables user to modify or delete a survey.

## 7. Help

This page depicts information about the OQSS in view of its concept, login, steps of creating a survey as well as the version of the system.

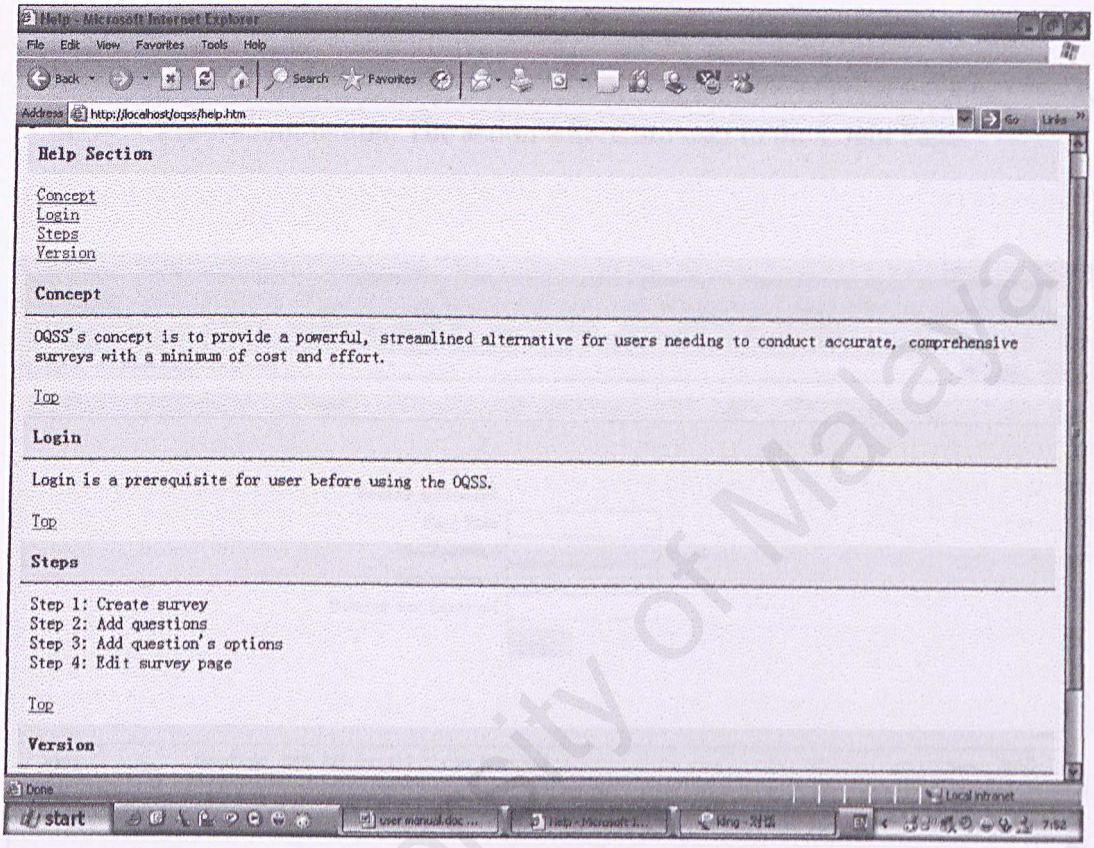



Figure 7 Help Section Page

## 8. Modify password

i. Click the Modify Password hyperlink. The Modify Password Page will appear. Before that user must login to the system first.

ii. Key in User Name, Old Password, New Password and Reenter New Password.

iii. Click Submit button. The action will return user to the Login Page.

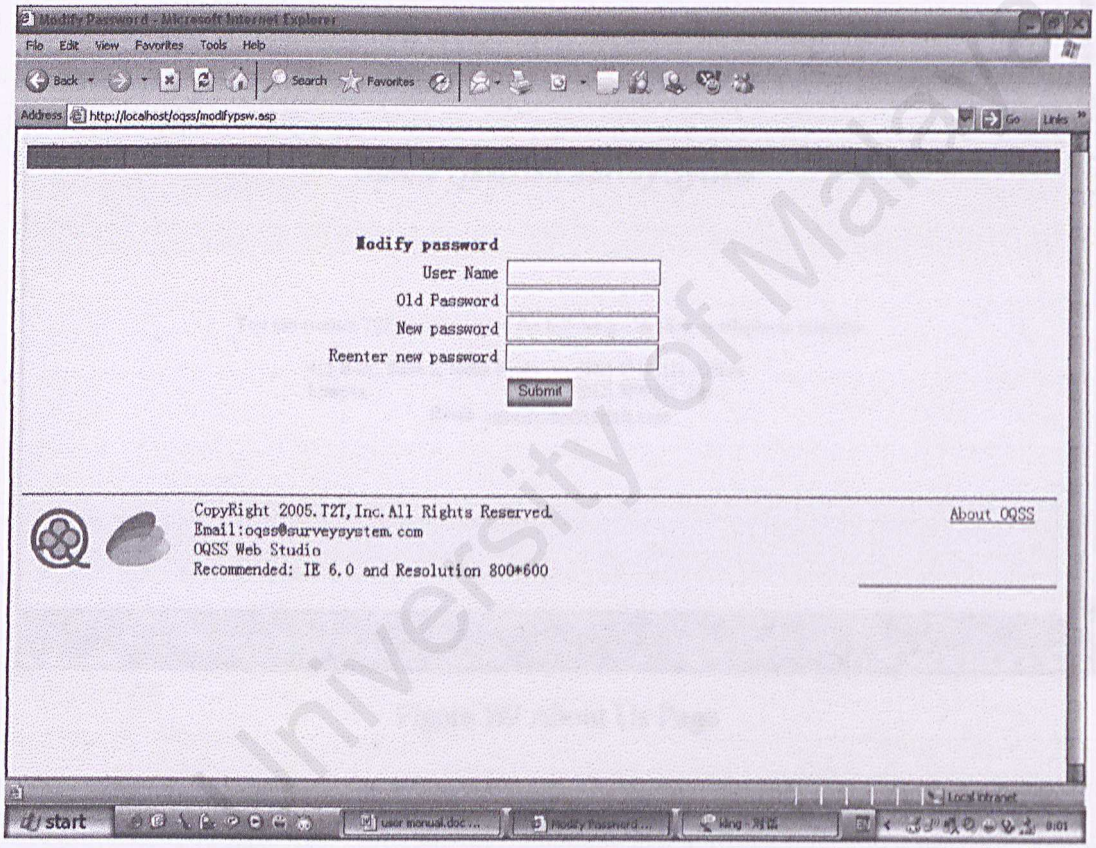



Figure 8 Modify Password Page

## 9. About Us

The page depicts the contact information of the company. Besides through the company address and phone number (Office and Hand phone), user also can sending email to the company.

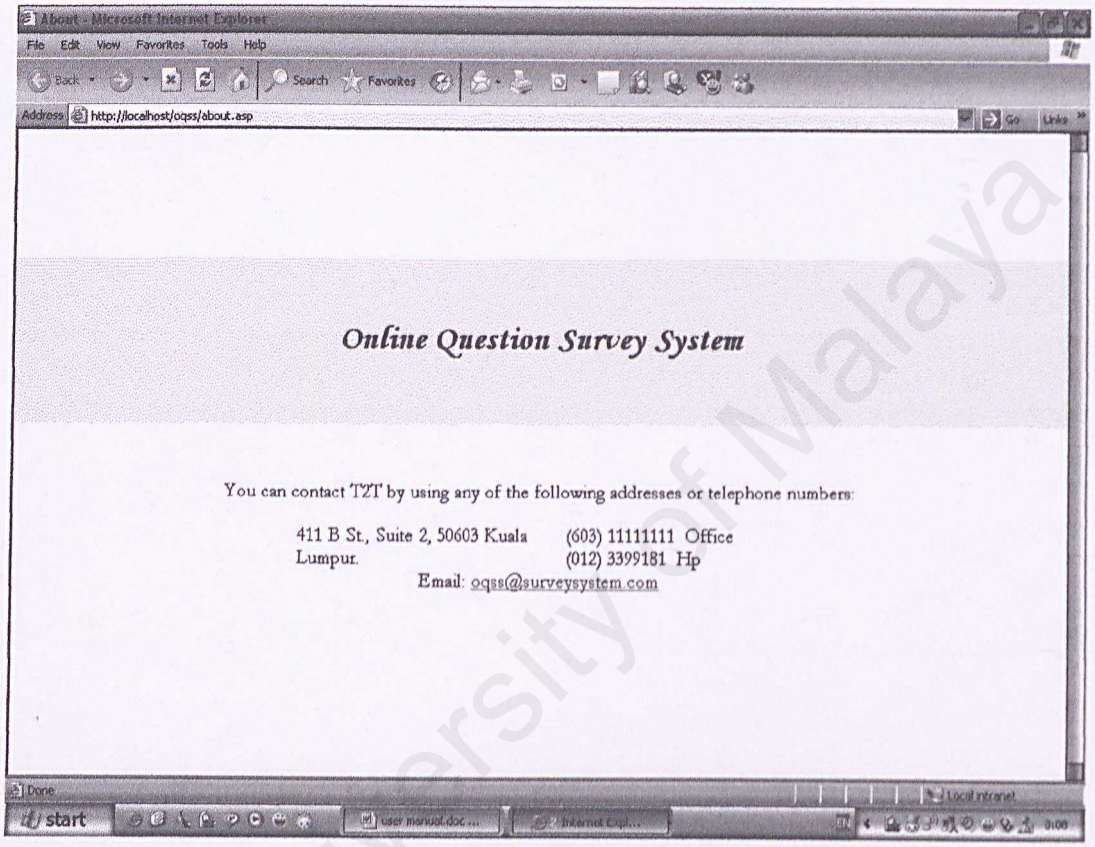



Figure B9 About Us Page